

Traceability Systems & Technologies Pilot in Alberta Auction Markets

Scanning Metrics

October 1, 2009 through June 30, 2010

Alberta Agricultural and Rural Development acknowledges Agriculture and Agri-Food Canada and Growing Forward for funding this project.

This document was produced only for information purposes by an independent consultant, Integrated Traceability Solutions, at the request of Alberta Agriculture and Rural Development. The user of this information is solely responsible for assessing and determining whether the information is appropriate for their own use. Alberta Agriculture and Rural Development does not make any warranties or guaranties as to the accuracy or completeness of any information, and does not accept any liability whatsoever for any defect, deficiency, error, or omission in any statement or information contained in, or in any way related to, the use of the information contained in this document.

Executive Summary

In September 2009 Alberta Agriculture and Rural Development (AARD) commissioned Integrated Traceability Solutions (ITS) to establish and operate reading facilities at six designated auction markets as a 10-month pilot project to examine establishing traceability systems in Alberta auction markets. The objectives of the project included determining the viability of available technology to scan all cattle arriving and departing the markets; read capabilities of the RFID system; uploading movement events to the CLTS; and establishing costs associated with implementing traceability systems in Alberta auction markets.

The designated auction markets were geographically diverse from North to South and East to West. They varied in size and cattle handling processes. The project manager provided the operational scanning staff for the project as well as all the necessary hardware and software for collecting and sharing information.

A custom software application was developed by ITS – Stockman™ (refer Appendix 2) – to receive the EID information from readers and to collect and store pertinent information about the groups of animals being processed. CCIA Age replication data was downloaded into the software for real-time age-verification as the cattle were processed. Movement data was uploaded directly to the Canadian Livestock Tracking System (CLTS) and associated with Manifest and Permit numbers for sharing with Livestock Identification Services (LIS).

The uniqueness of the Alberta auction markets required customised systems to be installed and configured. In each case, the designated auction market contributed land and facilities and made financial investments to both facilities and equipment. Implementation of this project in the midst of the fall run subjected the equipment and scanning staff to exceptional real-world pressures which demonstrated the robustness of the hardware, software and operational systems utilised.

It was critical to implement systems with minimal impact on speed of commerce. High flow scanning systems, which involved four panels on each side of a five-foot alley, were the primary reading system installed in four of the markets. One market relied on dual panel systems in single alleys in two pre-sort barns and a 2-meter wand for pen reading. One market utilized a 3-meter wand reader from a catwalk over the unloading area and a high flow for large lots. All sites incorporated the use of 1-meter wand reader in various situations.

In most cases, the distance cattle moved between unloading and penning was slightly increased, but there was little, if any, impact on wait times for cattle to be unloaded and no noticeable impact to the length of sales.

The reading systems were designed around each market's unique approach to receiving, shipping, and working with cattle in the pilot facilities. As the project progressed, potential design improvements were identified in some markets to enhance cattle flow and systems performance.

The project generated extensive data pertaining to the objectives of the project, with 248,335 cattle delivered to the markets. Although a range of issues that need to be addressed were illuminated, the project proved that the technology and associated equipment used in the project are capable of meeting the project goal of reading a minimum of 95 percent animals present at the markets with a functioning RFID tag.

The total percentage of EIDs read based on the number of cattle that entered the yards and were exposed to the scanner was 93.97 percent. After taking off the exceptions to get a true read rate of working EID devices, the read rate on EIDs presented to the scanner was 96.95 percent. To achieve this read rate, some cattle were scanned more than once with multiple EID readers, depending on each individual market process. In some situations, scanning staff did not intervene with all questionable lots to avoid impeding the speed of commerce

during large sales. As a result, the 3.05 percent of EIDs missed includes some cattle that did not have tags that were not identified as well as cattle with tags in poor orientation within the read field at the point of scanning.

This breakdown, and inclusion, of exceptions is important in evaluating the viability of equipment, but does not accurately reflect the effectiveness of the overall traceability system. The summary of Move-In and Move-Out data reveals that only 87.91 percent of the movement events were reported into the CLTS. The exceptions included:

- cattle without EID tags,
- cattle that were never scanned,
- inoperable (non reading) tags, and
- transfer errors involving the database.

These exceptions are already being dealt with, or they can easily be addressed. For example, cattle with bar-coded ear tags only (no EID tag) accounted for 3.1 percent of the cattle delivered to the markets. As of July 1, 2010, CFIA no longer recognizes barcode tags as official form of identification. It is impossible for the RFID readers to scan any of these tags.

Tag location also impacted read rates. For instance tag placement on the top of the ear can significantly interfere with the frequency emission from the tag to the reader system, especially with high flow systems. A simple producer education program outlining optimum tag placement could virtually eliminate this issue which would have an immediate improvement in read rates with the existing equipment in its current configuration.

A particular concern of the stakeholders at the start of the project was the impact of extreme weather conditions, especially low temperatures, on the reading equipment. Temperatures in all yards during the project were monitored and compared against the reading data. There was no notable reduction in read rates for the 117 of the 307 sales that occurred at subzero temperatures. The only notable weather impact was on wand battery life, which was reduced as temperatures fell.

The number of head per lot scanned varied significantly, ranging from 1 to 595 head. Of the 15,171 lots, 257 bypassed the scanner or were comprised of cattle with barcode tags only. After adjusting for exceptions, 82.93 percent of the lots yielded a 100 percent read rate and 4.81 percent had read rates ranging from 95 to 99.99 percent. This is a total of 87.74 percent of the lots meeting or exceeding the project goal for read rates. It should also be noted that of the 12.26 percent of lots that had read rates less than 95 percent, 1.5 percent had a read rate of less than 50 percent.

Small lots of 1 to 10 head accounted for 11.96 percent of lots that had a read rate less than 95 percent. This low read rate can likely be attributed to the fact that most small lots are consigned by small and part time producers, who typically are not as familiar with proper tag placement and traceability. Cattle with frozen ears were also usually included in these small lots, with tag orientation a factor because of placement limitations.

Three primary reading systems were utilized in the project: High Flow Multi Panel; Single Alley Dual Panel; and Wand (three lengths) as shown in Appendix 1. All systems exceeded the project minimum read rate of 95 percent when accounting for exceptions. As expected, wand-based systems produced the highest read rate, 98.72 percent. High Flow Multi Panel systems generated a 97.26 percent read rate. Single Alley Dual Panel systems had a read rate of 98.16 percent.

Stress and shrink are two key concerns of cattle producers in regards to implementing traceability systems in auction markets. The majority of the cattle in the project were exposed to little, if any, additional stress or

shrink. However, 14.78 percent of the lots and 18.48 percent of the cattle were subject to additional handling in order to identify animals without tags, barcodes and non reading tags.

Animals suspected to not have tags or non reading tags were routed to a single alley reading system or to an area conducive to the use of a wand. This additional handling occurred almost exclusively in conjunction with high flow systems. Animals that went through the high flow panel reading system without tag or with a non reading tag were handled a second time in order to be sorted from the lot and retagged. During bred cow sales most of the cattle were scanned using a wand during pregnancy checking.

The additional time necessary to scan cattle was an important area of concern for cattle producers, market operators, and buyers. Throughout the project, cattle passing through high flow systems or cattle that required retagging at the markets travelled outside of the normal flow of cattle compared to how cattle moved through the facility prior to the initiation of the project. During the project, 10,691 head were retagged, representing 4.31 percent of the cattle.

The time to scan cattle in single alley reader systems and with wands in chutes was directly related to how cattle typically move through these configurations. One of the auction markets used two single alleys to scan heifers and steers separately in a pre-sort setting. Cattle were in constant motion going through the processing chute with little to no breaks in the process. This system scanned 248.38 head per hour when cattle were in constant motion, however the absolute read performance of the systems is 28,800 reads per hour which will never be reached in reality at an auction market.

The primary limiting factor in total time to scan cattle in high flow systems was the time when the cattle arrived. High flow systems were used at four of the auction markets for both regular and calf sales. In certain sales there were lengths of time when no cattle arrived. In 31 sales with an average of 1,127 head and 25 retags, the average time to scan all the cattle was 8 hours, 2 minutes, and 52 seconds. Of the five reading scenarios, the multi panel averaged the highest average read speed at 135 head per hour.

Another important component of the project involved data related to age verification. Age replication data was downloaded into the Stockman™ software from the CCIA database prior to each sale. As cattle were scanned, the software automatically alerted the scanning crews through a combination of audible and onscreen messages as to the age verification status of each animal. Of the 248,335 cattle moved into the auctions 62.35 percent were age verified, and 112,135 were identified as calves, with 75.15 percent age verified.

It is common practice for groups of cattle to be recognized as age verified at the market when the consignor provides a birth certificate with the cattle. In some instances during the project, EID numbers on the birth certificate presented with the stock did not match the numbers scanned.

In other cases birthdates were not assigned to all of the tags in sequential order, even though the reported birthdates were all registered with the same calving start date. There were 6,466 lots of calves processed;

- 46.15 percent of the lots had every calf age verified;
- 27.79 percent of the lots had some calves age verified; and
- 26.06 percent of the lots had no calves age verified.

As the project evolved, scanning staff worked with the CCIA Mobile Field Representatives who were onsite at the pilot markets to assist in age verifying animals that showed in the software as not being age verified. An additional 25,857 animals were age verified through this process that would have normally been missed.

The following sections of this final report on the project focuses on the myriad of data analyses associated with reading tags and collecting information for Move-In and Move-Out reporting. Detailed business analysis and business cases for the different scenarios for implementing traceability systems in auction markets is presented in a separate report.



Table of Contents

- EXECUTIVE SUMMARY1**
- 1 INTRODUCTION.....1**
- 1.1 PURPOSE OF THIS REPORT..... 2
- 1.2 MARKET TYPES..... 2
- 2 GENERIC DESCRIPTION OF MOVE IN AND MOVE OUT PROCESS3**
- 3 BACKGROUND TO TABLES & CALCULATIONS4**
- 4 PROJECT DATA SUMMARY7**
- 5 SUMMARY OF MOVEMENT EVENTS9**
- 5.1 READING EFFICIENCIES..... 10
- 6 READING METHODOLOGY11**
- 6.1 BYPASSED SCANNER 12
- 6.2 RETAGGING CATTLE 13
- 6.3 BAR CODES..... 14
- 6.4 NON-READING TAGS..... 15
- 6.5 DUAL TAGS..... 17
- 6.6 TAG ORIENTATION..... 18
- 6.7 INTERFERENCE..... 21
- 6.8 BENCH MARKED READ RATE DISTRIBUTION 22
- 6.9 TOP LOTS READ..... 25
- 7 READING SYSTEMS26**
- 7.1 WAND APPLICATION AND PERFORMANCE..... 27
- 7.2 PANEL APPLICATION & PERFORMANCE 27
- 8 HANDLING / INTERVENTION29**
- 9 SPEED OF COMMERCE30**
- 9.1 READING TIME 32
- 9.2 PEAK READING TIMES..... 33
- 9.3 TIME IN MOTION..... 34
- 9.4 TIME IN MOTION CONCLUSION 35
- 10 REPORTING METHODOLOGY36**
- 10.1 CLTS TRANSFER ERRORS..... 37
- 10.2 INVALID TAGS 38
- 10.3 AGE VERIFICATION..... 39
- 11 READING RESULTS OVERVIEW41**
- 11.1 ALL AUCTION MARKETS/ALL TYPES OF CATTLE 41
- 11.2 ALL TYPES OF CATTLE/ALL AUCTION MARKETS MOVE IN 41
- 11.3 ALL TYPES OF CATTLE/ALL AUCTION MARKETS AGE VERIFICATION 42

11.4 ALL TYPES OF CATTLE/ALL AUCTION MARKETS MOVE OUT 43

11.5 REGULAR SALES MOVE IN 43

11.6 REGULAR SALES AGE VERIFICATION/OTHER INFORMATION 44

11.7 CALF SALES MOVE IN 44

11.8 CALF SALES AGE VERIFICATION/OTHER INFORMATION 45

11.9 SPECIALTY SALES “MOVE IN” 45

11.10 SPECIALTY SALES AGE VERIFICATION/OTHER INFORMATION 46

CONCLUSION 47

APPENDIX ONE: READING SYSTEMS 49

ALEIS™ WAND READER MODEL 9030 49

ALEIS™ DUAL PANEL READING SYSTEM 51

ALEIS™ HIGH FLOW READING SYSTEM 53

APPENDIX TWO: STOCKMAN™ SOFTWARE 55

APPENDIX THREE: TERMS AND ACRONYMS 60

PROJECT PARTICIPANTS 61

REFERENCES 62

BIBLIOGRAPHY 63

1 Introduction

In July 2009 Alberta Agriculture and Rural Development (AARD) released a Request for Proposals for the project “Traceability Systems and Technologies Pilot in Alberta Auction Markets.” AARD collaborated with the Alberta Auction Markets Association to develop the objectives of the project, these included;

- determining the viability of available technology to scan all cattle arriving and departing the markets;
- read capabilities of the RFID systems;
- uploading movement events to the CLTS; and
- establishing costs associated with implementing traceability systems in auction markets.

In September 2009 AARD contracted with Integrated Traceability Solutions (ITS) to conduct the pilot project in six Designated Auction Markets. The designated Auction Markets where;

- VJV Foothills Livestock Auction
- Southern Alberta Livestock Exchange
- Perlich Bros. Auction Market Ltd.
- Provost Livestock Exchange
- Stettler Auction Mart
- Sekura Auctions Ltd.

The first requirement was to conduct a review of the six Designated Auction Markets to determine the most suitable location to install equipment for installation to conduct a ‘Move In’ process. The second task was to determine the RFID Reading equipment to install at these locations.

Each market operator expressed a desire to have some sort of ‘automated’ system and in most cases wide alley RFID Reading systems. Aleis™ RFID Reading systems where chosen for the sites as a means of providing some degree of control over reading consistency across the contemporary group of sites as the product range offered by this manufacturer provided the full range of systems required and these systems have consistently proven to achieve exceptionally high read rates throughout the world for reading low frequency RFID technology.

Data was collected under a myriad of operational and environmental conditions at the six sites from October 2009 through to June 2010. Where possible reading commenced upon the arrival of the 1st animal at the facility and concluded with the reading of animals out of the facility where existing operational practices allowed.

This report shows the challenges many in the industry believed were inherent to implementing traceability systems in auction markets whilst also exposing a range of others issues, and their potential solutions.

The project however also highlighted the potential positive outcomes for the implementation of traceability in Alberta auction markets. This knowledge base of workable solutions and challenges to implementing traceability in auction markets will be invaluable as industry and government move forward together in an effort to protect and enhance the Canadian Cattle industry.

The intent of this report is to provide an objective presentation of the information as well as a blueprint for the broader implementation of RFID Reading systems into Alberta auction markets and other comingling sites.

The following pages include a broad spectrum of tables and charts and include data presented in tabular format. Much of the data in the tables is reported, but some of it is calculated. For a complete explanation of the data and calculations please reference Background to Tables & Calculations.

1.1 Purpose of This Report

This report provides, in detail, the data collected in the project titled “Traceability Systems and Technologies Pilot in Alberta Auction Markets,” commissioned by Alberta Agriculture and Rural Development.

The data shown was collected on 248,335 head received in the markets from October 2009 through the end of June 2010 and is utilized in a wide range of charts to provide a thorough examination of the project.

1.2 Market Types

The auctions were separated into three sections in this report;

- Medium;
- Large; and
- Pre-Sort.

In the pilot project there were two medium, three large and one pre-sort auction.

Small markets are considered to be those with annual volumes of less than 20,000 head, none of which were among the pilot study markets.

Medium markets are considered to be those with annual volumes between 20,000 and 50,000 head. There were two markets in this range in the pilot study; their metrics were averaged for use in comparisons.

Large markets are considered to be those with annual volumes between 50,000 and 120,000 head. There were three markets in this range for the pilot study.

Pre-Sort Markets are considered to be those within which all cattle except cows and bulls are weighed and sorted using individual scales the day prior to the sale. Annual volumes for these markets are between 50,000 and 120,000 head. There was one market in this category in the pilot study.

Extra-Large Markets are considered to be those with annual volumes over 120,000 head. No markets of this size were among the pilot study markets.

2 Generic Description of Move In and Move Out Process

Move In

- The Move In process starts as cattle begin to arrive at the auction market, often the day prior to the sale and continues until the last animals arrive on the day of the sale. However, in some cases cattle continue to arrive at the market for several hours after the sale has begun.
- Project scanning staff operated reading equipment and data collectors to record RFID information as the cattle are received. They are moved through the reading system and delivered to their nominated pen. They also conduct simultaneous presale auditing activities, and deal with discrepancies and CLTS errors as they are identified.
- Cattle with missing or non reading tags are retagged and rescanned.
- Several CLTS database queries and transactions are processed. They include;
 - Verification of devices;
 - Age Verification;
 - Move In Recording;
 - Retag transactions, if necessary; and
 - Other events relevant to the market.

Move Out

- The Move Out process started when an auction began and often continued well after the sale was completed. In some cases this could be days following the sale.
- Adjustments were made for cattle staying over at the facility or alternately for cattle whose delivery location changed. This occasionally required a certain number of cattle to be reprocessed.
- Project scanning staff operated reading equipment and data collectors as the cattle were dispatched, moving them through the reading system and delivering them to their nominated transport operator. They also conducted simultaneous post sale auditing activities, and dealt with discrepancies and CLTS errors as they were identified.
- A LIS Permit was required before Move Out events were recorded.
- Several CLTS database queries and transactions were processed, including:
 - Move Out Recording; and
 - Other events relevant to the market

Additional Notes

- At the conclusion of the sale day, the total cattle received were balanced with the total cattle dispatched. Also, the actual number of cattle received was cross referenced with the cattle numbers shown on the Move In Manifest documentation. Any discrepancies were identified and corrected.
- It was rare that the same staff and/or equipment were used for both Move In and Move Out activities, because these processes took place for the duration of the sale, which often exceeded 36 hours from when the first animal was received.

3 Background to Tables & Calculations

Market	EID's Presented @ Scanner	EID's Read	% EID's Read	% Exposed Animals Read	% Animals Move Out Read	CCIA Transfer Errors	% Movement Events	% Movement Events Not
--------	---------------------------	------------	--------------	------------------------	-------------------------	----------------------	-------------------	-----------------------

Term

Definition

Percent Movement Events Reported

The percentage of animals in a sale successfully reported to the CLTS.

= Percent Animals in Sale Read - Percent CCIA Transfer Errors.

Percent Movement Events Not Reported

The percentage of animals in a sale NOT successfully reported to the CLTS.

Market	# Head	# Bypassed Scanner	EID's Presented @ Scanner	EID's Read	% EID's Read	% Exposed Animals Read	% Animals Move Out Read
--------	--------	--------------------	---------------------------	------------	--------------	------------------------	-------------------------

Term

Definition

Percent Exposed Animals Read

Percentage of all of the cattle in the sale read less those that were not exposed to an EID scanner.

= EIDs read / (# Head in Sale - # Bypassed Scanner)

Percent Animals in Sale Read

Percentage of all the cattle in the sale read.

= EIDs read / # Head in Sale

Market	# Lots	# Head Moved Out	# Bypassed Scanner	# Barcodes	# Non Readers	EID's presented @scanner	Dual Tags	# Missed	EID's Read	% EID's Read	% Missed
--------	--------	------------------	--------------------	------------	---------------	--------------------------	-----------	----------	------------	--------------	----------

Term

Definition

Of Head in Sale

Number of head sold by a participating auction market at a given sale.

Bypassed Scanner

Number of head not offered for reading. This usually occurred when an owner refused to have his/her cattle scanned, an individual buyer requested cattle be loaded without being scanned, or reading staff deemed it necessary in order to not disrupt the speed of commerce.

#w/out tag (not retagged)

Number of cattle in a sale that arrived without an EID tag and were not retagged prior to being penned.

Bar Codes

Number of animals with barcode tags and no EID.

# Non Readers	Number of EID tags present in the ear of animals which did not activate and respond when queried by a reading system.
EIDs Presented at Scanner	Number of functioning EIDs presented to reading system. = <u>(# of Head in sale + Dual Tags) - (# Bypassed Scanner + # w/out tag (not retagged) + # Bar Codes + # Non Readers)</u>
Dual Tags	Occasionally one animal had two EIDs. The number in the table represents the number of animals with two tags.
# Missed	Number of functional EIDs presented to a reading system which do not read and were not recorded.
EIDs read	Number of functional EIDs scanned and successfully recorded in the software. = <u>EIDs Presented at Scanner - Dual Tags - # Missed.</u>
Percent EIDs Read	Percentage of functional EIDs read. = <u>EIDS read / EIDs Presented at Scanner.</u>
Percent Missed	Percentage of EIDs presented to a scanner which were not successfully read by the RFID reading equipment. = <u># Missed / EIDS Presented at Scanner.</u>

Market	Pre Sale Age Verified	Pre Sale Not Verified	Pre Sale Incorrect Birthdates	Additional Animals Verified	Post Sale Not Verified	Post Sale Age Verified	% TTL of Animals Verified	Total Retags	# Lots	Ave. Lot Size
--------	-----------------------	-----------------------	-------------------------------	-----------------------------	------------------------	------------------------	---------------------------	--------------	--------	---------------

<u>Term</u>	<u>Definition</u>
Pre Sale Age Verified	Number of EIDs read that were checked against the CCIA database and found to have a birth date/age recorded upon arrival at the Auction Market.
Presale Not Verified	The number of EIDs read that were checked against the CCIA database and found to NOT have a birth date/age recorded upon arrival at the Auction Market.
Presale Incorrect Birthdates	The number of EIDs read that were checked against the CCIA database and found to have a birth date/age recorded, BUT the age recorded did not correspond to the age of the actual animal. For example, a tag that was registered for a calf might be put in a mature cow. The tag is still considered to be Age Verified, but the age shown on the CCIA system does not correctly depict the actual age of the animal.
Additional Animals Verified	24 hours after the animals were scanned, project staff resubmitted all of the EIDs to the CCIA database. If more

animals were found in the second submission, they were recorded as **Additional Animals Verified**.

Post Sale Age Verified

Total number of animals age verified after the second submission of EIDs to the CCIA database. This includes the number of incorrect age verified animals.

Post Sale Not Verified

Number of animals without a birth date / age data in the CCIA database after the second submission of the EID.

Total Retags

Number of animals delivered to an Auction Market without a tag which were tagged at the market.

Lots

Number of lots (groups) of scanned cattle.

Market	Total # Head	Total # Lots	Scanned Only	% of Total	Lots Handled	% of Total Lots	Head In Lots Handled	% of Total Head	Actual Head Handled	% of Total Head
--------	--------------	--------------	--------------	------------	--------------	-----------------	----------------------	-----------------	---------------------	-----------------

Scanned Only

These animals were scanned and provided to the auction staff for pre-sale procedures with no further intervention.

Lots Handled

The number of lots that contained animals that were brought to the Auction Market to be tagged or were identified as having non functioning EIDs.

Head in Lots Handled

The total number of animals in the lots containing animals that needed to be handled. These animals may have been handled during the sorting process to identify and separate the specific animals that needed further processing.

Actual Head Handled

The number of animals that were retagged or identified as having a non functioning tag.

4 Project Data Summary

MOVE IN

- **# of Head in Sales—248,335**
The total number of cattle delivered for sale.
- **Bypassed Scanner—2.07%, 5,152**
These are cattle that were not scanned at any point. Reasons for this included producers and buyers requesting cattle not be read and concerns and / or perceptions that diverting cattle to a reader could disrupt the speed of commerce.
- **Percent Exposed Animals Read—93.65%**
Percentage of all animals successfully read that were exposed to the reader.
- **No Tags Entering Market—4.45%**
This is the quantity of animals received at the markets that were discovered to not have tags present in their ears. Although most of these were retagged before leaving market, some were not retagged. In addition, some cattle without tags may have not been totally identified due to the limited ability to modify some of the facilities.
- **Total Number of Head Retagged – 4.31%, 10,691**
- **#w/out tag (not retagged)— 0.15%, 366**
Cattle that were recognized to have entered and are known to have left the market with no tag.
- **Bar Codes—3.11%, 7,734**
Some cattle, the majority being mature, had CCIA bar code tags and no EID.
- **Non Readers— 0.60%, 1,412**
These tags simply did not read.
- **EIDs presented to scanner—94.15%, 233,827**
The number of functional tags on animals presented to the reader.
- **Percent of EIDs Read—96.95%**
The percentage of functional EIDs in the market that were exposed to, and read by, the installed reading systems.
- **Percent all Animals in Sale Read—92.18%**
Percentage of all animals in the sale that were successfully read.

MOVE OUT

- **# of Head Moved out of sale – 80,299**
The total number of animals in the markets presented by the Auction Market staff for move outs.
- **Percent of Animals in Sale Moved Out – 32.33%**
The percentage of total animals in sale that were presented for move out.
- **Bypassed Scanner – 1.74%, 1,107**
- **Percent of EIDs Read—96.35%**
The percentage of functional EIDs in the market that were exposed to, and read by, the installed reading systems.
- **Percent Exposed Animals Read – 95.89%**
Percentage of all animals successfully read in the Move-Out process that was exposed to the RFID reading system.

DATA TRANSFER

- **CCIA Transfer Errors—4.43%**
Quantity of the EID numbers reported to the CLTS as Moved In or Moved Out, which were reported to have an error associated with them. Errors resulted from un-registered tags, wrong event order, and incorrect animal tag type.
- **Percent Movement Events Reported—87.75%**
Calculated by subtracting **Percent CCIA Transfer Errors** from **Percent Animals in Sale Read**.

AGE VERIFICATION

- **Percent of Pre-Sale Verified Animals – 45.87%, 113,900 Head**
The number of animals with readable EIDs that arrived at the market age verified.
- **Percent of Post-Sale Verified Animals – 62.35%, 141,541 Head**
The number of animals with readable EIDs that were verified within 24 hours after the sale.
- **# of Incorrectly Verified Animals – 2.07%, 2,935**
The amount of incorrect birth dates in animals showing a birth date on the CCIA system.
- **Percent of Verified Calves – 75.15%**
The overall age verification rate in calves entering the markets.
- **Percent of Calf Lots with No Verified Animals – 26.06%**
The percentage of calf groups entering the market with no age verified animals.
- **Percent of Calf Lots with Some Verified Animals – 27.79%**
The percentage of calf groups entering the market with only some age verified animals.

5 Summary of Movement Events

There are a number of factors which can potentially impact successful data collection and uploading to the CLTS. During the project, just 86.58 percent of all movement events were successfully reported to CLTS (Table 1). There is a significant loss of traceability data through CCIA Transfer Errors (4.43%) which occurred for a range of reasons (Table 1).

Table 1: Movement Events Reported - Move In and Move Out

Market	Head	EID's Presented @ Scanner	EID's Read	% Move In EID's Read	% Move Out EID's Read	% Exposed Animals Read	% Animals in Sale Read	CCIA Transfer Errors	% Movement Events Reported	% Movement Events Not Reported
Medium	74,832	68,725	66,220	97.80%	96.81%	91.47%	87.73%	6.33%	81.40%	18.60%
Large	171,907	164,644	159,930	96.67%	91.68%	93.33%	92.66%	4.55%	88.11%	11.89%
Pre-Sort	81,895	79,279	76,794	96.51%	98.25%	94.72%	93.77%	2.43%	91.34%	8.66%
Total	328,634	312,648	302,944	96.95%	96.35%	93.65%	92.18%	4.43%	87.75%	12.25%

As part of the project, scanning staff recorded 'exceptions' in the animals offered for reading. This included animals that bypassed the scanner, did not have an EID tag, were retagged, and animals with barcodes and non reading EID tags (Table 2).

Table 2: Exceptions – Move In

Market	# Bypassed Scanner	% Bypassed Scanner	% No Tags Entering Markets	# Retags	% Retags	# w/out Tag (not retagged)	% w/out Tag (not retagged)	# Barcodes	% Barcodes	# Non Reading Tags	% Non Reading Tags
Medium	3,098	5.74%	5.57%	3,002	5.56%	7	0.01%	2,313	4.28%	439	0.91%
Large	1,230	1.00%	4.63%	5,518	4.51%	148	0.12%	4,019	3.28%	764	0.66%
Pre-Sort	824	1.15%	3.31%	2,171	3.02%	211	0.29%	1,402	1.95%	209	0.30%
Total	5,152	2.07%	4.45%	10,691	4.31%	366	0.14%	7,734	3.11%	1,412	0.60%

5.1 Reading Efficiencies

The target read rate set by AARD in the RFP was a minimum of 95 percent of all RFID Tags present in the livestock at the time of reading.

This target read rate was met in every month of the pilot project, ranging from a low of 95.29 percent in October to a high of 98.42 percent in December. The lower read rate in October can be attributed to time spent training project scanning staff to use the reading systems as well as optimising the configuration of the equipment installed at each site.

Table 3: Reading Efficiencies by Month - Move In

Month	# Head	# Bypassed Scanner	# No Tag (not retagged)	# Bar Codes	# Non Readers	EID's Presented @Scanner	Dual Tags	# Missed	EID's Read	% EID's Read	% Missed
October	36,799	226	5	614	52	35,915	13	1,679	34,223	95.29%	4.71%
November	68,722	1,221	11	1,934	115	65,496	55	1,848	63,593	97.09%	2.91%
December	26,237	504	44	1,343	108	24,247	9	375	23,863	98.42%	1.58%
January	19,778	1,967	85	737	152	16,857	20	398	16,439	97.52%	2.48%
February	25,232	267	39	649	153	24,141	17	717	23,407	96.96%	3.04%
March	32,180	627	75	625	373	30,494	14	681	29,799	97.72%	2.28%
April	16,812	193	39	481	188	15,927	16	513	15,398	96.68%	3.32%
May	13,520	70	45	789	194	12,423	1	296	12,126	97.61%	2.39%
June	9,055	77	23	562	77	8,327	11	156	8,160	97.99%	2.01%
Total	248,335	5,152	366	7,734	1,412	233,827	156	6,663	227,008	96.95%	3.05%



Picture 1: Scanning staff entering data at an auction market.

6 Reading Methodology

Project scanning staff primarily read groups of cattle coming into the markets through high flow multi panel RFID Readers at five of the six auctions in the pilot project. Each of these yards was provided with a 2-meter wand to scan smaller groups of cattle in their receiving pens to avoid moving all of the cattle through the fixed reading equipment in an attempt to minimize concerns with stress and shrink.

At one of the auctions, a 3-meter wand and a high flow multi panel RFID Reader were used to scan each sale. Pre-sort auctions used a dual panel reading system mounted on presort alleys and a 2-meter wand to scan cows and bulls in their pens.

Each yard was provided with a 1-meter wand, which enabled cattle to be scanned chute side while they were being retagged, pregnancy checked, semen tested, and / or to identify non reading tags so that they could be cross referenced with the CCIA database. The Stockman™ software used in the pilot project facilitated the recording of RFID tag numbers and the necessary reporting of move-in/move-out records to the CCIA database.

As part of the reading process, reading staff kept track of the number of animals that:

- bypassed RFID Readers;
- had no tag and were retagged;
- had no tag and were not retagged;
- had a bar code tag and no EID;
- did not have a functioning tag (“non-readers”);
- had multiple tags (“dual tags”); and
- had tag orientation issues.

Recording these exceptions required scanning staff to go well beyond simply walking animals through a reading alley or reading the animals with a wand. If a group of cattle passed by the RFID readers and a 100 percent read rate was not achieved, staff typically checked the group of cattle for missing tags and tag orientation issues by moving the cattle through a single alley reading system or they simply rescanned them with a wand. When practical, missed animals were sorted out in order to fully evaluate the problem, and ideally to retag those animals found to be without tags.

Project scanning staff were supplied with a 2-meter wand to read cattle which were not brought through the high flow RFID reading system. While this was not always feasible, it could be done on smaller lots or groups to ensure that all the cattle in the sale were read. The wands also allowed the project scanning staff to safely read bulls and cows in smaller pens, avoiding any hazardous contact with these types of animals.

The Stockman™ software was custom designed to display the age verification status on each animal recorded based on CCIA age replication data. A report was generated on calves without birthdates and the data was sent to the onsite Mobile Field Representative (MFR) so that these groups of cattle could be age verified.

6.1 Bypassed Scanner

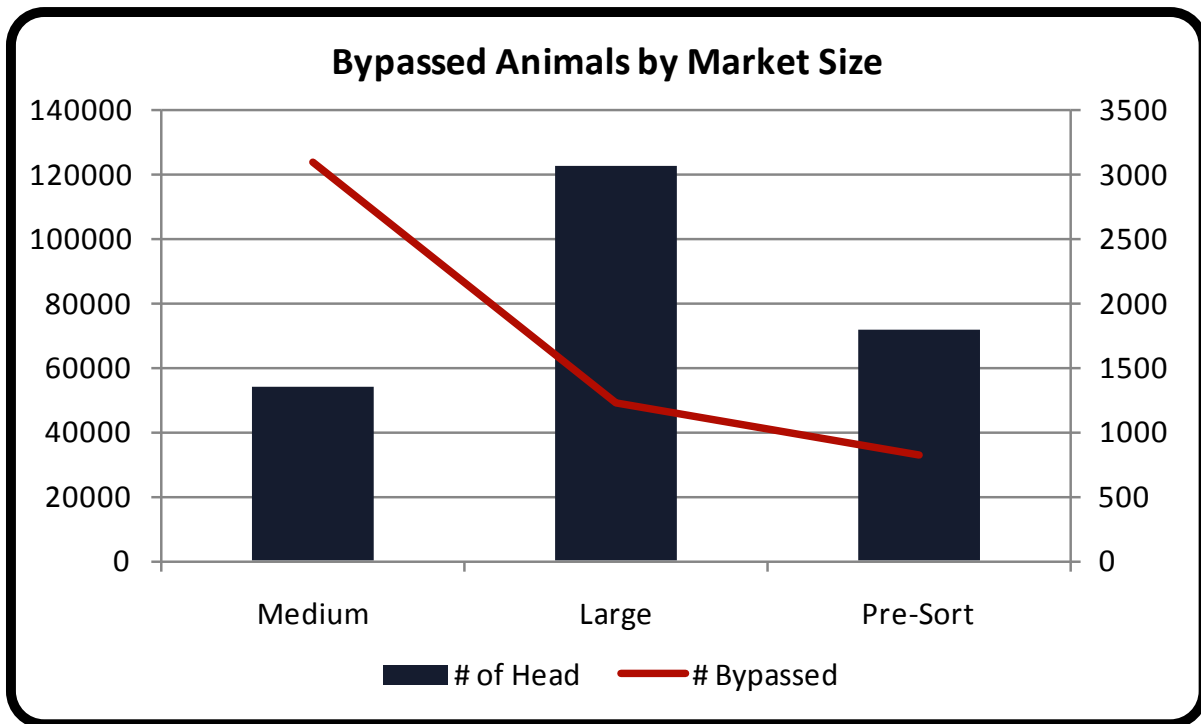
On occasion, lots of cattle were not read. This was the result of auction staff moving cattle before they were read or requests by vendors to not have their animals scanned.

In total, 2.07 percent (Table 4) of the animals bypassed the RFID reading systems and did not enter the traceability system. As all parties became aware of the scanning process and efficiencies were introduced, the number of cattle bypassing the scanner dropped significantly as the project progressed.

Table 4: Percent of Total Head Bypassed Scanner – Move In

Market	# Head	# Bypassed	% Bypassed
Medium	53,996	3,098	5.74%
Large	122,423	1,230	1.00%
Pre-Sort	71,916	824	1.15%
Total	248,335	5,152	2.07%

Graph 1: Bypassed Animals by Market Size



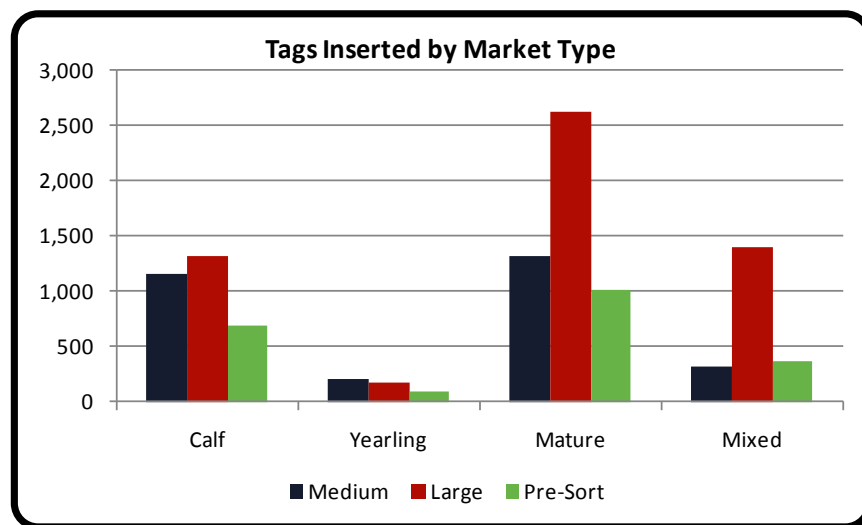
6.2 Retagging Cattle

One of the challenges towards a full traceability system is dealing with the number of cattle that require a tag upon arrival at any required reading location. Table 5 shows that there were 10,691 head of cattle retagged during the project, representing 4.31 percent of the total cattle received. The greatest numbers of retagged animals were mature cows and bulls which represented nearly half of all of the animals retagged during the project.

Table 5: Total Retags by Age Group – Move In

Market	Calf	Yearling	Mature	Mixed	Total Retags	# Sales	Average/Sale	# Head	% Retags
Medium	1,156	203	1,320	323	3,002	87	71	53,996	11.12%
Large	1,312	172	2,626	1,408	5,518	169	33	122,423	4.51%
Pre-Sort	689	98	1,020	364	2,171	51	43	71,916	3.02%
Total	3,157	473	4,966	2,095	10,691	307	35	248,335	4.31%

Graph 2: Tags Inserted by Market Type



The retagging process was both time and resource consuming at an Auction Market, especially when animals had to be identified and sorted from within larger lots. At times, cattle were not retagged, predominantly because the animals arrived too close to the commencement of, or during, the sale process. This number was nominal, but must be accounted for in proceeding with traceability. On 248,335 head, 0.15 percent were not retagged (Table 6).

Table 6: Percent of Total Head with No Tag that were Not Retagged – Move In

Market	# Head	# No Tag	% No Tag
Medium	53,996	7	0.01%
Large	122,423	148	0.12%
Pre-Sort	71,916	211	0.29%
Total	248,335	366	0.15%

6.3 Bar Codes

A total of 7,734 bar code tags were identified on cattle as they passed through the RFID Readers (Table 7). The majority of animals presented with bar codes were mature cattle over three years of age, but in some instances calves or yearlings were found to have a bar code tag in their ear.

Table 7: All Animals with Barcodes – Move In

Market	# Lots	# Head	# Barcodes	% of Total Head
Medium	733	53,996	2,313	4.28%
Large	1,191	122,423	4,019	3.28%
Pre-Sort	307	71,916	1,402	1.95%
Total	2,231	248,335	7,734	3.11%

A total of 1852 lots were categorised as mature animals with bar codes present. Of these lots of mature animals, 13.14 percent had barcodes (Table 8).

Table 8: All Mature Lots with Barcodes – Move In

Market	# Lots	# Head	# Barcodes	% of Total Head
Medium	599	13,692	1,850	13.51%
Large	978	22,365	3,087	13.80%
Pre-Sort	275	10,233	1,146	11.20%
Total	1,852	46,290	6,083	13.14%

Table 9 shows a comparison of the number of animals in mature lots that had bar codes by quarter. It is worth noting the reduction in January to March when producers thought that they were going to be required to remove and replace the bar code tags with EID tags. Once it became known that enforcement of this requirement was delayed, the percentage of bar codes present increased again.

Table 9: Quarterly Comparison of All Mature Lots with Barcodes – Move In

Quarterly Comparison	# Lots	# Head	# Barcodes	% of Total Head
October - December	713	17,837	2,917	16.35%
January - March	556	15,825	1,646	10.40%
April - June	583	12,628	1,520	12.04%

6.4 Non-Reading Tags

Non-reading tags are those that do not emit a readable frequency when interrogated by the RFID reading equipment. These tags were discovered during the reading process when it was visually apparent that all animals were tagged but there were less EID's recorded than physical animals present. In some cases a non-functioning tag would start to read again after intervention and manipulation.

Of the 233,827 EIDs presented to the RFID Readers, 0.60 percent was found to be non-reading tags (Table 10). Non reading tags were often found in groups of one producer's cattle with the most being 26 non reading tags found in one lot of 144 head at a Medium sized auction. Other auctions had similar findings, with 22 non reading tags found in a lot of 95 head at a large auction and 12 non reading tags found in a lot of 76 head at a Pre-Sort auction.

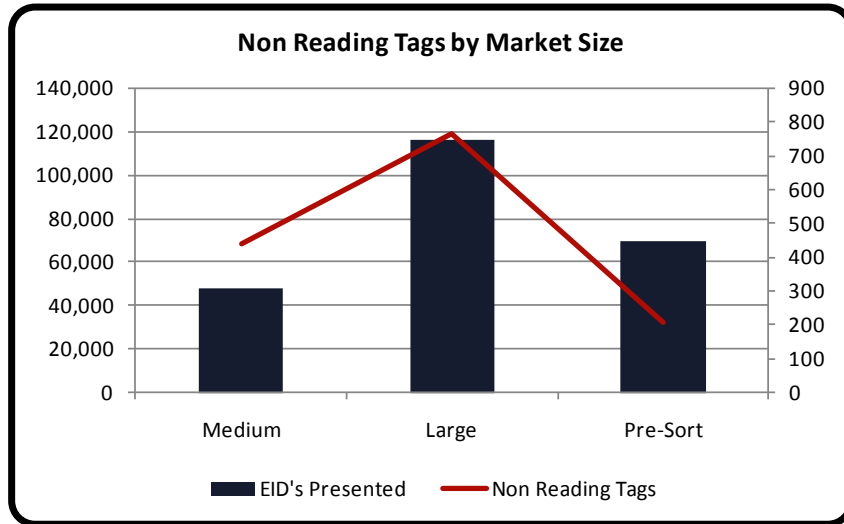
The overall rate of 0.60 percent non reading tags is below the CCIA trial protocol standard (version 6.0) of 1 percent read rate failure for approved tags; as such, the results show that the interaction of tags and reading systems is within the reading standards set by CCIA for tags alone. It is apparent however that the rate of non reading devices in Canada is significantly above that accepted in similar livestock producing countries around the world that utilise RFID systems as their primary form of livestock traceability.

Table 10: Non Reading Tags Presented by Quarter – Move In

Market	Head	EID's Presented	October - December		January - March		April - June		% of EID's
			# Lots	Non Reading Tags	# Lots	Non Reading Tags	# Lots	Non Reading Tags	
Medium	53,996	48,184	26	42	74	133	98	264	0.91%
Large	122,423	116,342	85	212	192	452	62	100	0.66%
Pre-Sort	71,916	69,301	14	21	50	93	44	95	0.30%
Total	248,335	233,827	125	275	316	678	204	459	0.60%

CCIA regulations prohibited the removal of non reading tags, which prevented a physical assessment of potential tag damage to be made as part of this study. Failing to remove non functioning tags, once identified, simply continues to pass the costs involved in manually processing livestock further down the industry production chain as each time the animal is processed it requires manual intervention to maintain any form of traceability. There is no benefit to be gained in not replacing and cross referencing these tags with working devices immediately at the point they are identified.

Graph 3: Quantity of Non Reading Tags by Market Size



Picture 2: Using a long wand reader to identify non reading tags.

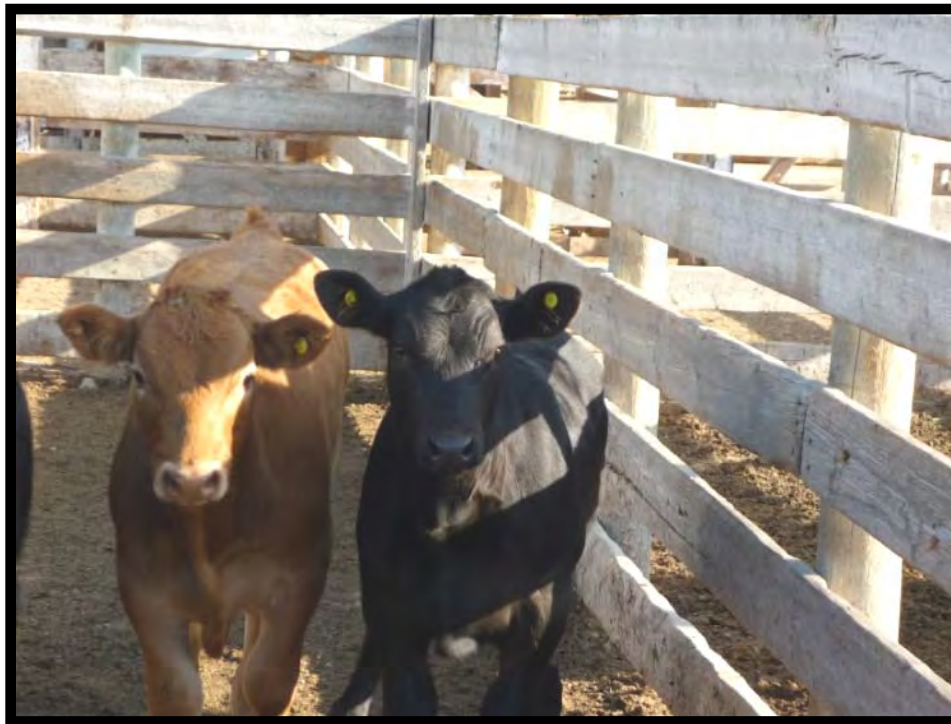
6.5 Dual Tags

Occasionally an animal with two tags was scanned, with some markets experiencing more dual tags than others.

Dual tags are an inaccuracy but not a complication of traceability as long as the tags are cross referenced on the CCIA system. The quantity of dual tags were removed from the number of EIDs read in the calculations in order to ensure that the read rates shown were representative of the quantity of unique animals with functioning EID tags. Of the 248,335 head processed there were 0.07 percent dual tags found (Table 11) within the data set.

Table 11: Total Dual Tags in EID/s Presented – Move In

Market	# Head	EID's Presented	# Dual Tags	% Dual Tags
Medium	53,996	48,184	45	0.09%
Large	122,423	116,342	80	0.07%
Pre-Sort	71,916	69,301	31	0.04%
Total	248,335	233,827	156	0.07%



Picture 3: Dual tags in a calf.

6.6 Tag Orientation

Poor tag orientation means that the tag was placed deep inside the ear next to the skull or, most commonly, on the top of the ear. Applying the tags to the very top of the ear interferes with the frequency emission from the tag to the reader system. Tags placed in this position can also significantly reduce tag retention.

In simple terms, an EID tag has two orientation points when presented at any one point of an antenna, best and worst. Best orientation means that the EID tag will have a higher read distance from the antenna, and worst orientation means that the EID tag will have a lower read distance from the antenna.

Table 12 provides an indication of how tag placement impacts read rates. A broad selection of lots which were identified by scanning staff to have reading issues was sampled. A significant percentage of those exhibited poor tag orientation. All lots shown in the table were scanned using the high flow reader and project scanning staff visually recognized tag placement in an undesirable location. In each instance there was a noticeable decrease in read rates.

Table 12: EID's and Animals Read in Lots with Tag Orientation Issues – Move In

Sale Type	Age Group	# Of Head In Lot	EID's Read	%of EID's Read
Reg	Calf	21	13	61.90%
Reg	Mature	42	33	78.57%
Bull	Calf	17	9	52.94%
Bull	Calf	16	8	50.00%
Calf	Calf	100	89	89.00%
Calf	Calf	110	98	89.09%



Picture 4 and 5: Calf with undesirable RFID tag location in the top of the animal's ear.

Environmental and Weather Impacts One of the perceived influencing factors on RFID Reading performance was the impact of temperature, particularly cold weather, on the reading process, especially the equipment. Temperatures in all yards during were gathered and compared against the daily reading data.

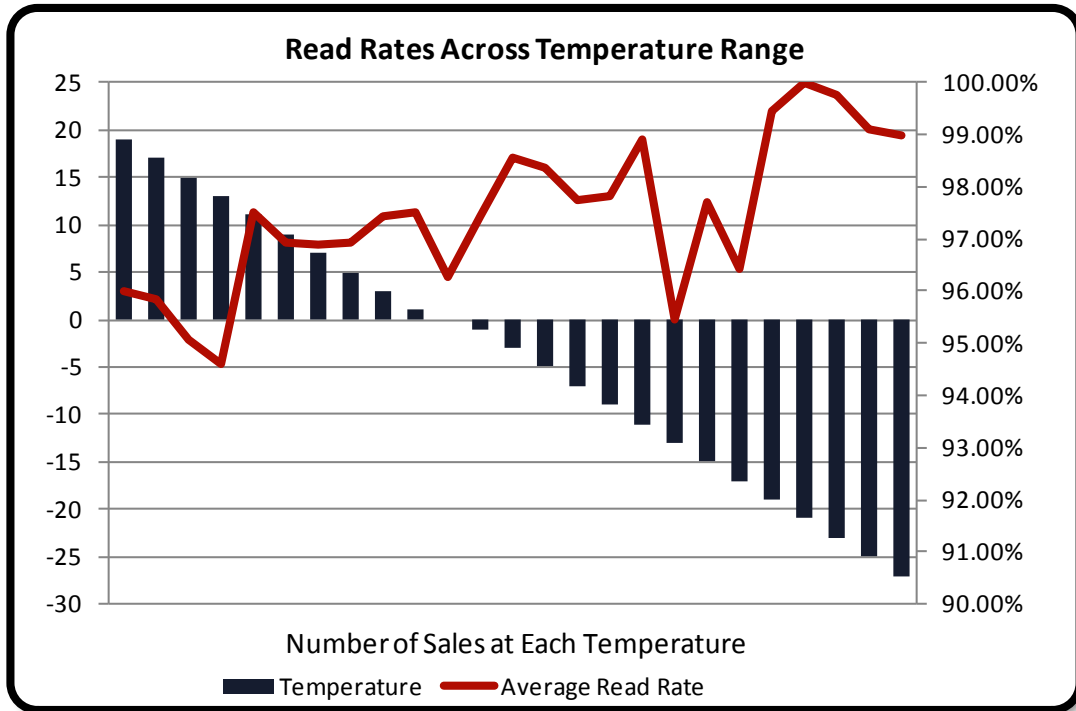
Severe cold temperatures had no impact on the performance of the RFID reading systems used in the pilot project. Table 13 summarizes the performance of the systems used in the project at various temperatures.

Table 13: Sale Temperature Data

Temperature	No.Head	Average Read Rate
19	1091	96.00%
17	877	95.86%
15	3251	95.08%
13	2209	94.58%
11	6514	97.53%
9	2612	96.94%
7	20595	96.88%
5	21485	96.93%
3	38559	97.44%
1	29676	97.50%
0	31752	96.28%
-1	24853	97.42%
-3	9893	98.58%
-5	6790	98.37%
-7	10254	97.75%
-9	13317	97.80%
-11	6029	98.90%
-13	5362	95.44%
-15	3213	97.69%
-17	3753	96.41%
-19	1704	99.44%
-21	185	100.00%
-23	2924	99.75%
-25	625	99.09%
-27	812	98.97%

The only discernible effect on the RFID equipment was a reduction in wand reader battery life as temperatures decreased. The multi panel readers seemed to generate enough internal heat inside their sealed reading modules and circuitry to not be effected by external temperature changes, resulting in the consistent performance of the RFID Reading systems regardless of temperature.

Graph 4: All Sales by Temperature



Picture 6: Using a long wand reader to scan cattle in -25 degree temperature.

6.7 Interference

RFID panel readers approved by the Canadian Cattle Identification Agency (CCIA) are required to achieve a high read percentage when set up in a typical installation. The panel readers must generate a strong enough magnetic field to activate the transponders and then be able to read the very small backscatter field generated by the transponder.

The ability of a panel reader to read the transponder is degraded by the presence of background noise. Such background noise can be caused by both natural and man-made sources.

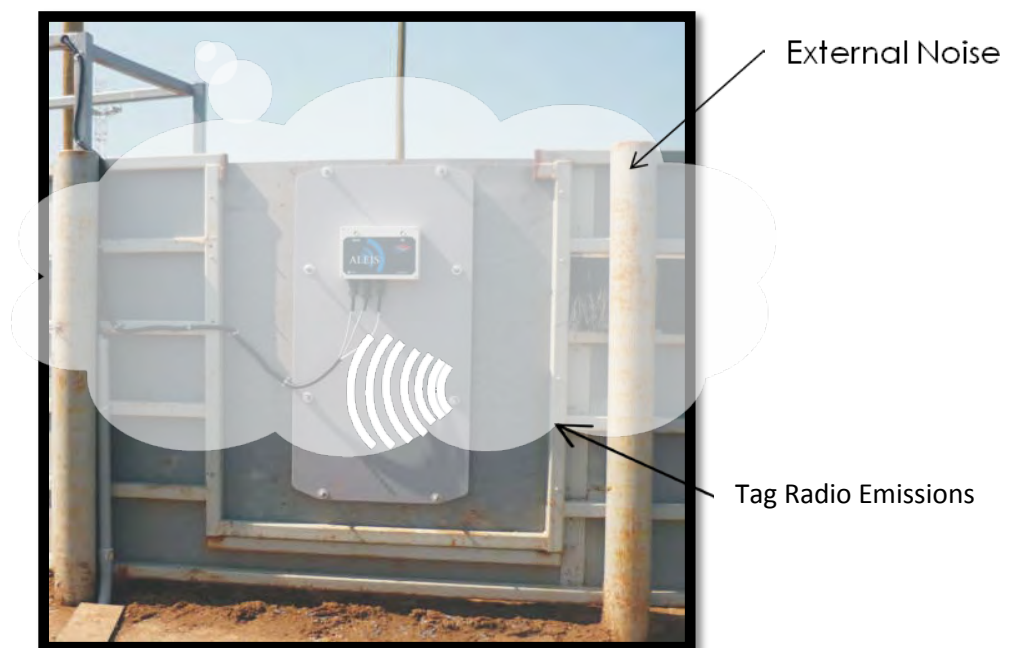
RFID transponders work by means of a magnetic field and consequently readers are prone to interference from magnetic field noise.

Experience has shown that panel readers can work well at certain times but suffer from relatively poor read performance at other times, based on the assumption that interference from noise sources is causing the poor performance. Potentially problematic levels of interference were found at most sites. The time available at each site was not sufficient to correlate the observed noise with poor read performance.

Some insight can be gained into how affected panel readers are by noise and interference by comparing them to hand-held and wand readers. Hand-held readers are typically held very close to the transponder and consequently the receiver can work with a strong back-scatter signal.

With panel readers, by contrast, the transponders are far removed from the antenna. This greater distance reduces the available backscatter signal and to compensate the receiver must be made more sensitive. This in turn makes the panel reader more prone to interference.

Figure 1: Interference can come from many sources. It's like driving in fog: your eyes work, your headlights are functional, but they can't cut through the fog.



6.8 Bench Marked Read Rate Distribution

The target read rate for the pilot project was set at a minimum of 95 percent of the livestock with functioning EID Tags presented to the reader. This performance requirement was met in 87.74 percent of the total lots presented to the scanners, with 82.93 percent of all lots yielding a 100 percent read rate (Table 14).

A further 4.81 percent of lots fell into the 95-99.99 percent category, with 7.45 percent of the lots falling under the 95 percent target (Table 14). A single non reading animal produced a 0 percent read rate and one non reading animal in a lot containing two head yielded a 50 percent read rate. This type of occurrence significantly increased the number of lots missing the 95 percent target.

The average reading rates increased through each quarter of the project. Many of these lots could have achieved higher results with intervention by scanning staff, which would be normal practice in a commercial environment.

Table 14: Read Rate Distribution – Overview - Read rates by lots, head, and percent of lot size range – Move In

Summary	0 - 24.99%	25 - 49.99%	50 - 59.99%	60 - 69.99%	70 - 79.99%	80 - 89.99%	90 - 94.99%	95 - 99.99%	100%	Barcode & Bypass	Total
# Lots	174	21	40	86	139	497	646	729	12,582	257	15,171
# Head	739	155	252	742	2,125	13,847	30,174	49,114	145,710	5,477	248,335
% of Total	1.15%	0.14%	0.26%	0.57%	0.92%	3.28%	4.26%	4.81%	82.93%	1.69%	100.00%

Within the total lots accounted for in the distribution, 1.69 percent (257 lots) did not produce a read rate because they bypassed the scanner completely or were comprised of animals with a bar code ear tag and no electronic identification. The one to 10 lot size ranges had the greatest amount of animals and the greatest amount of lots in the 100 percent category, which can be attributed to the easier sorting process of smaller groups to retag and find non functioning tags in a timely manner (Table 15).

Table 15: Read Rate Distribution by Lot Size –Read rate distribution as a percent of the total across each lot size range – Move In

Head	0 - 24.99%	25 - 49.99%	50 - 59.99%	60 - 69.99%	70 - 79.99%	80 - 89.99%	90 - 94.99%	95 - 99.99%	100%	Barcode & Bypass	Total
1 - 10	1.67%	0.18%	0.35%	0.69%	0.69%	1.93%	0.36%		91.97%	2.16%	100.00%
11 - 20	0.18%	0.09%	0.22%	0.44%	1.93%	4.75%	10.33%	0.66%	80.83%	0.57%	100.00%
21 - 30	0.11%			0.57%	1.59%	7.47%	7.36%	14.04%	68.52%	0.34%	100.00%
31 - 40					0.93%	5.02%	14.50%	16.73%	61.71%	1.12%	100.00%
41 - 50	0.24%	0.24%		0.24%	1.21%	6.05%	8.72%	25.67%	56.66%	0.97%	100.00%
51 - 60	0.36%		0.36%	0.73%		6.18%	15.27%	23.27%	53.45%	0.36%	100.00%
61 - 70	0.41%					5.74%	12.70%	28.69%	52.05%	0.41%	100.00%
71 - 80	0.45%					6.36%	17.27%	33.18%	42.73%		100.00%
81 - 90					0.64%	8.28%	18.47%	38.85%	33.12%	0.64%	100.00%
91 - 100						10.69%	12.21%	40.46%	35.88%	0.76%	100.00%
> 100	0.47%				0.93%	4.19%	19.07%	33.95%	34.42%	6.98%	100.00%
Total	1.15%	0.14%	0.26%	0.57%	0.92%	3.28%	4.26%	4.81%	82.93%	1.69%	100.00%

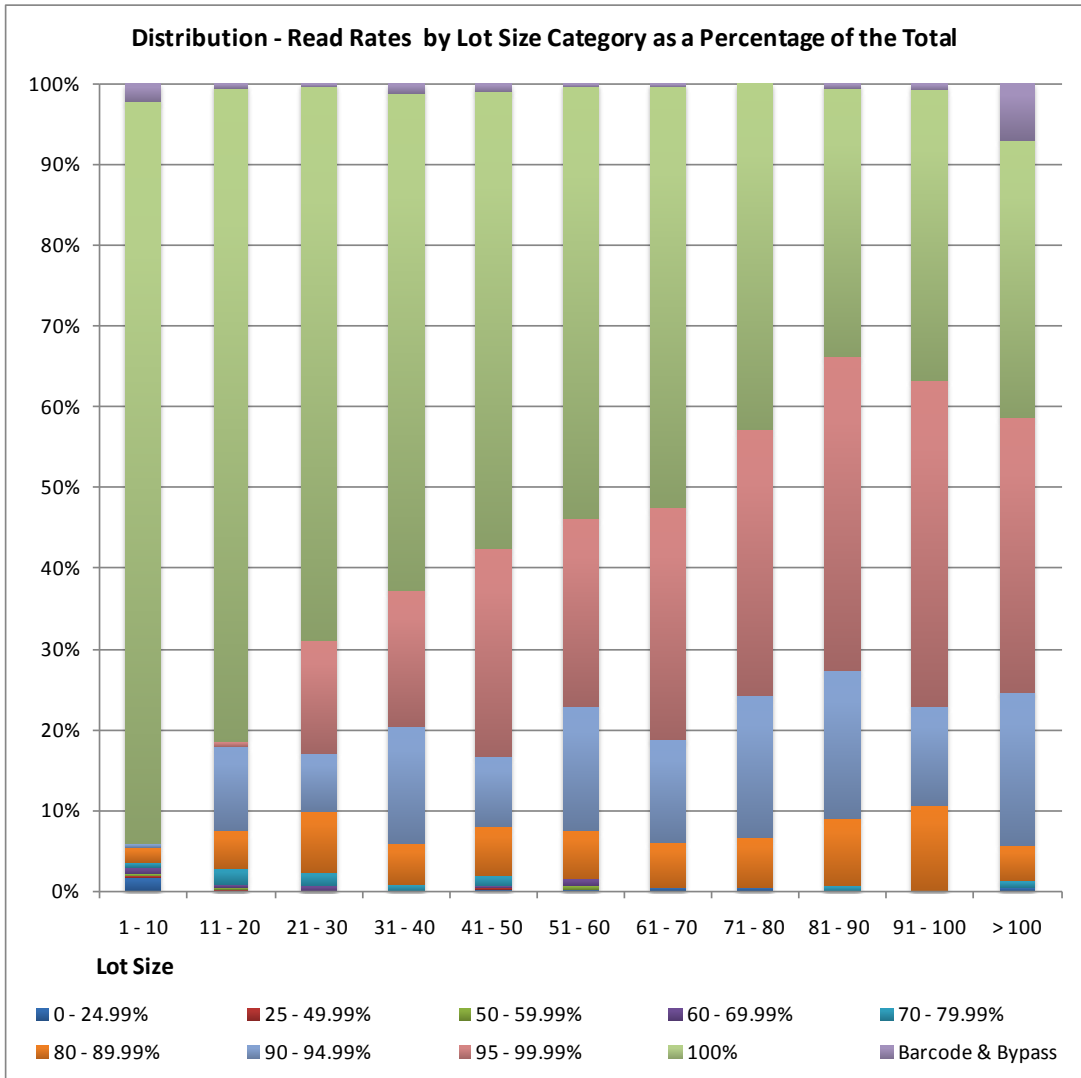
Table 16: Read Rate Distribution by # of Lots –Number of lots in each read rate across the lot size range – Move In

Head	0 - 24.99%	25 - 49.99%	50 - 59.99%	60 - 69.99%	70 - 79.99%	80 - 89.99%	90 - 94.99%	95 - 99.99%	100%	Barcode & Bypass	Total
1 - 10	164	18	34	68	68	190	35		9,032	212	9,821
11 - 20	4	2	5	10	44	108	235	15	1,838	13	2,274
21 - 30	1			5	14	66	65	124	605	3	883
31 - 40					5	27	78	90	332	6	538
41 - 50	1	1		1	5	25	36	106	234	4	413
51 - 60	1		1	2		17	42	64	147	1	275
61 - 70	1					14	31	70	127	1	244
71 - 80	1					14	38	73	94		220
81 - 90					1	13	29	61	52	1	157
91 - 100						14	16	53	47	1	131
>100	1				2	9	41	73	74	15	215
Total	174	21	40	86	139	497	646	729	12,582	257	15,171

Table 17: Read Rate Distribution by # of Head –Number of head in each read rate across the lot size range – Move In

Head	0 - 24.99%	25 - 49.99%	50 - 59.99%	60 - 69.99%	70 - 79.99%	80 - 89.99%	90 - 94.99%	95 - 99.99%	100%	Barcode & Bypass	Total
1 - 10	309	86	135	318	407	1,366	350		38,463	653	42,087
11 - 20	56	23	65	135	670	1,698	3,517	300	26,728	175	33,367
21 - 30	28			126	341	1,645	1,679	3,112	15,040	84	22,055
31 - 40					177	958	2,773	3,253	11,662	226	19,049
41 - 50	45	46		48	238	1,153	1,655	4,857	10,544	175	18,761
51 - 60	52		52	115		927	2,290	3,513	8,113	60	15,122
61 - 70	69					919	2,069	4,609	8,393	70	16,129
71 - 80	77					1,041	2,897	5,506	7,096		16,617
81 - 90					84	1,114	2,491	5,202	4,424	84	13,399
91 - 100						1,347	1,529	5,080	4,480	100	12,536
>100	103				208	1,679	8,924	13,682	10,767	3,850	39,213
Total	739	155	252	742	2,125	13,847	30,174	49,114	145,710	5,477	248,335

Graph 5: Read Rates by Lot Size category as a Percentage of the Total



6.9 Top Lots Read

Table 18 provides an overview of the lots with the greatest number of animals along with the total EIDs read and the corresponding read rates. The read rates are presented as the percent of EIDs Read and the percent of Animals Read. The project scanning staff read the majority of the large lots in the first three months of the pilot project during the large fall cattle run.

Table 18: Top Lots Read by Sale Type – Move In

Sale Type	Type of Scanner	Age Group	# Of Head In Lot	EID's Presented @ Scanner	EID's Read	%of EID's Read
Regular Sale	Multi	Mixed	403	403	398	99.21%
Calf Sale	Multi	Ca lf	203	203	200	98.52%
Bred Sale	Single	Mixed	423	411	410	100.00%
Bred Sale	Wand	Mixed	495	429	429	100.00%
Regular Sale	Single	Mixed	339	320	320	100.00%
Regular Sale	Multi	Ca lf	595	595	564	94.79%

Picture 7: Large lot of calves moving through a Multi Panel High Flow scanner.



7 Reading Systems

Three primary reading systems were employed, including:

- High Flow Multi Panel;
- Single Alley Dual Panel systems; and
- Various length Wand Readers.

Wands were divided into three categories;

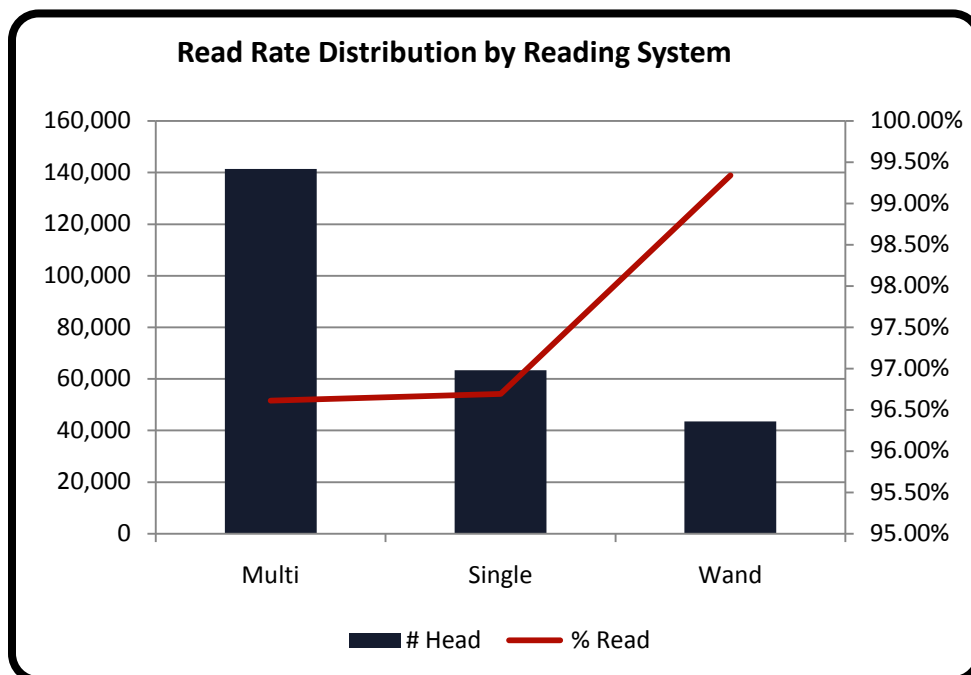
- short wand (1-meter or less);
- 2-meters; and
- 3-meter.

The individual needs of each site were addressed in the installation and provision of the reading systems. Read rates varied with each of the reading systems. As expected, wand-based systems gave the highest read rates (Table 19), although both the single alley and multi panel systems also easily exceed the project target. Table 19 breaks out the average number of head scanned in a sale using each reading system.

Table 19: Read Rate and Number of Head by Reading System – Move In

Scanner Type	# Lots	# Head	EID's Presented	EID's Read	% Read
Multi	7,363	141,449	132,615	128,123	96.61%
Single	3,099	63,382	62,748	60,674	96.69%
Wand	4,709	43,504	38,464	38,211	99.34%
Total	15,171	248,335	233,827	227,008	97.08%

Graph 6: Read Rate Distribution by Reading System



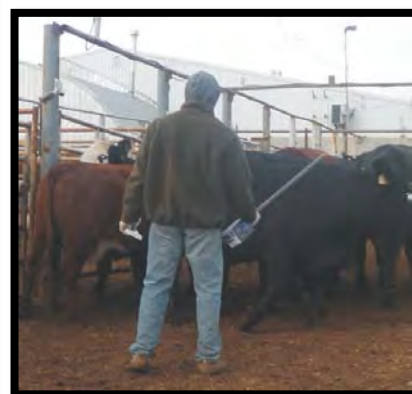
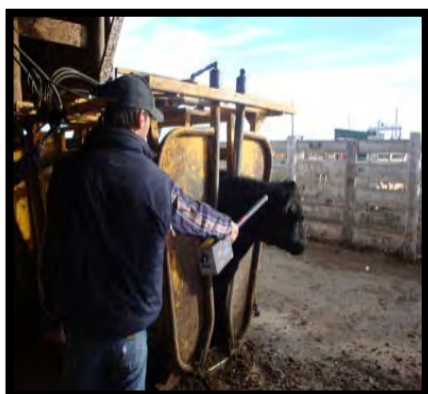
7.1 Wand Application and Performance

Each of the six auctions utilized a wand in some capacity during the scanning process. While the data capture mechanism on every system was the same, the wand length ranged in meter increments from one to three.

The variable wand lengths provided adaptability to individual reading situations, which reduced operator risk of injury and minimized animal stress. The short wand was used to scan cattle in the chute during pregnancy checking while the 2-meter wand was used to scan cattle directly in a pen. The 3-meter wand was used at one of the auctions to scan from an overhead catwalk.

Table 20: Total Lots Scanned by Length of Wand – Move In

Market / Type	# Lots	# Head	EID's Presented	EID's Read	% Read
Short Wand	359	11,703	10,494	10,484	99.90%
Medium	42	772	717	708	98.25%
Large	295	9,026	8,135	8,125	99.96%
Pre-Sort	64	2,677	2,359	2,359	100.00%
2 Meter Wand	1,504	12,811	10,762	10,566	98.18%
Medium	500	2,979	2,672	2,666	98.30%
Pre-Sort	1,004	9,832	8,090	7,900	96.19%
3 Meter Wand	2,804	18,218	16,491	16,453	99.77%
Medium	2,804	18,218	16,491	16,453	98.96%



Pictures 8, 9 and 10: Reading with a short wand reader at chute side (8); Reading with a 3-meter wand reader from catwalk (9); Reading with a 2-meter wand reader in a pen (10).

7.2 Panel Application & Performance

The Aleis™ RFID Reader panel technology was employed in both high flow and single alley systems to provide a means of control over the dataset. In a high flow application there are four readers per alley side. In a single

alley application one reader panel is used per side. Although EID tags are typically read multiple times by multiple panels, a sophisticated filtering system ensured the tags were only recorded once in the Stockman™ software. All information was relayed by the panels to a central data box housed in the scanning office, which was centrally located in the scanning area at each site.

Table 21: Total Lots Scanned by Multi Panel and Single Alley – Move In

Scanner Type	# Lots	# Head	EID's Presented	EID's Read	% Read
Multi Panel	7,363	141,449	132,615	128,123	97.14%
Medium	3,538	50,245	44,795	43,233	98.61%
Large	3,825	91,204	87,820	84,890	97.12%
Single Alley	3,099	63,382	62,748	60,674	95.86%
Large	77	3,975	3,896	3,878	99.67%
Pre-Sort	3,022	59,407	58,852	56,796	95.77%



Pictures 11 and 12: Dual panel reader on a single alley

8 Handling / Intervention

The following is a breakdown of the lots that were scanned only and lots that had some form of additional handling or intervention. Lots that were 'Scanned Only' reflect those that on the first read all animals were identified as having either an EID or a bar code.

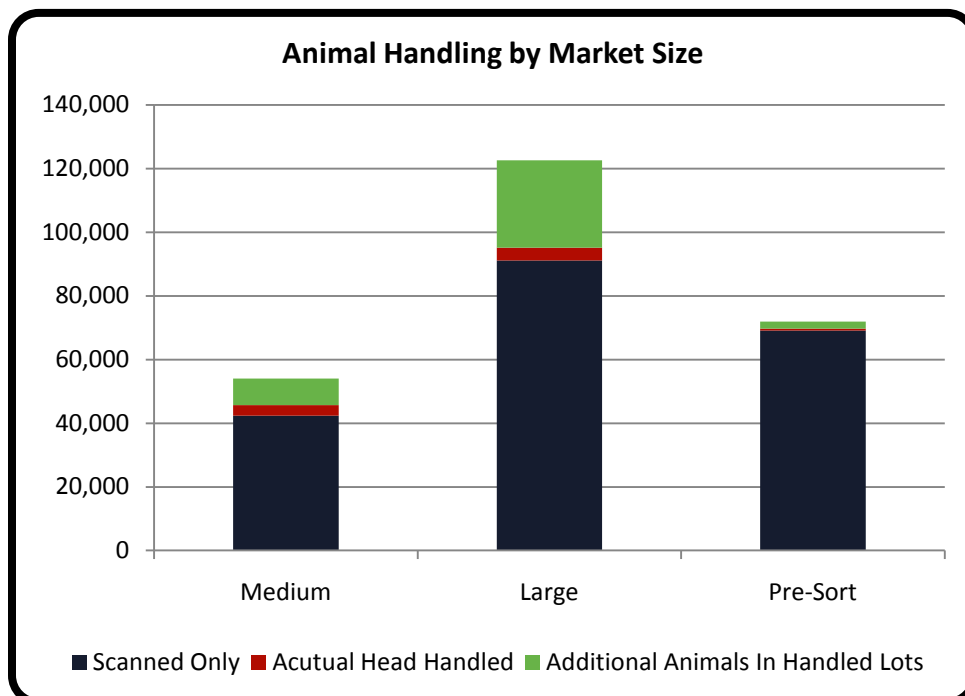
Animals found to be without a tag or found to have a non reading tag were identified in the single alley system or with a wand. During bred cow sales all cattle were scanned using a wand during the pregnancy checking process.

Animals scanned using the multi panel reading system found to have no tag or a non-reading tag were handled a second time in order to be sorted from the lot and retagged. Of the 15,171 lots, 2,242 lots needed to be handled for retagging purposes (Table 22).

Table 22: Lots that Required Rehandling for Retagging or to Identify Non Reading Tags – Move In

Market	Total # Head	Total # Lots	Scanned Only	% of Total	Lots Handled	% of Total Lots	Head In Lots Handled	% of Total Head	Acutual Head Handled	% of Total Head
Medium	53,996	4,080	42,404	78.53%	775	19.00%	11,592	21.47%	3,286	6.09%
Large	122,423	7,001	91,071	74.39%	1,359	19.41%	31,470	25.71%	4,018	3.28%
Pre-Sort	71,916	4,090	69,077	96.05%	108	2.64%	2,839	3.95%	616	0.86%
Total	248,335	15,171	202,552	81.56%	2,242	14.78%	45,901	18.48%	7,920	3.19%

Graph 7: Lot Handling/ Intervention by Market Size



9 Speed of Commerce

The main concern from the participating auction markets, associated industry participants, and producers was that there would be an impact on the speed of commerce during the reading process. There is no common industry definition for ‘Speed of Commerce,’ making it difficult to determine a benchmark for measurement.

For the sake of this project, ‘Speed of Commerce’ is defined as “the total time taken for a market to normally receive, draft, sell and deliver livestock prior to the commencement of any scanning activities, taking into consideration industry best management practices for safe, stress-free animal handling.”

In order to gather the required data to analyse this concept, project scanning staff were required to follow a specific protocol in regards to reading and data collection (Refer to Generic Description of Move In and Move Out Process, Page 3). This process may not have been the most efficient for reading in Alberta auction markets, but it met the criteria to gather the required data for this pilot project.

There were 328,634 head of cattle scanned in 307 sales, in 16,637 lots. A total of 8,549 staff hours was required to do a move in and a selected move out. This was an average of 16.83 hours per sale with an average of 65.07 head per sale per hour (Refer to Table 24).

Table 23a: Speed of Commerce - Move In

Market	# Head Scanned	Total Scanning Hours	MOVE IN				
			Head Per Wage Hour	No Sales	Average Staff Hours Per Sale	Average Scanning Hours Per Sale	Average Head/Sale/Hour
Market 1	36,880	1,501	24.57	58	25.88	8.63	73.71
Market 2	40,654	1,129	36.01	60	18.82	9.41	72.02
Market 3	71,916	714	100.72	51	14.00	14.00	100.72
Market 4	33,875	1,323	25.60	42	31.50	14.00	57.61
Market 5	20,121	1,018	19.77	45	22.62	11.31	39.53
Market 6	44,889	1,020	44.01	51	20.00	10.00	88.02
Total	248,335	6,705	41.78	307	22.14	11.22	71.93

Table 23b: Speed of Commerce - Move Out

MOVE OUT							
Market	# Head Scanned	Total Scanning Hours	Head Per Wage Hour	No Sales	Average Staff Hours Per Sale	Average Scanning Hours Per Sale	Average Head/Sale/Hour
Market 1	1,089	32	34.03	2	16.00	8.00	68.06
Market 2	20,581	297	69.30	27	11.00	11.00	69.30
Market 3	9,979	159	62.76	18	8.83	8.83	62.76
Market 4	19,652	785	25.03	40	19.63	9.81	50.07
Market 5	1,184	48	24.67	3	16.00	8.00	49.33
Market 6	27,814	523	53.18	43	12.16	8.11	79.77
Total	80,299	1,844	44.83	133	13.94	8.96	63.22

Table 24: Speed of Commerce - Move In and Move Out.

MOVE IN & MOVE OUT							
Market	# Head Scanned	Total Scanning Hours	Head Per Wage Hour	No Sales	Average Staff Hours Per Sale	Average Scanning Hours Per Sale	Average Head/Sale/Hour
Market 1	37,969	1,533	24.77	58	26.43	9.11	71.83
Market 2	61,235	1,426	42.94	60	23.77	13.58	75.15
Market 3	81,895	873	93.81	51	17.12	17.12	93.81
Market 4	53,527	2,108	25.39	42	50.19	25.10	50.78
Market 5	21,305	1,066	19.99	45	23.69	11.84	39.97
Market 6	72,703	1,543	47.12	51	30.25	24.20	58.90
Total	328,634	8,549	42.34	307	28.57	16.83	65.07

9.1 Reading Time

Reading systems were designed around each market's unique approach to receiving, shipping, and working with cattle within the facilities. There were five reading methods used throughout the project that suited the needs of each auction. This section analyzes each method in terms of the average length of time it took to scan a sale. Samples of eight sales from each auction were used to arrive at the averages presented in Table 23.

Scan Time is defined as the total time it takes to scan the animals through the different reading systems in the varied range of lot sizes.

Table 25: Average Scan Time per Sale by Reading Method – Move In

Scanning Method	Sale Type	Scanner Type	# of Head	Retags	Total Scanning Time	Head/Hr	Head/Min	Sec/Head
Multi Panel Scanner	Regular/Calf	Multi	1,127	24.61	8:02:52	135.92	2.27	34.86
Multi Panel /Wand Scanning off Catwalk	Regular/Calf	Multi/Wand	1,195	29.50	10:10:43	111.75	1.86	42.70
Wand Scanning in Chute	Bred	Wand	224	33.33	7:32	29.69	0.49	121.49
Pre-Sort Single Alley Scanner	Regular/Calf	Single	836	14.88	6:55:52	110.79	1.85	45.26
Single Alley Scanner	Bred	Single	405	148	12:30	31.57	0.53	114.66

Multi Panel Reading System: The multi panel was used at four of the six auctions for both regular and calf sales. The length of time needed to scan a sale was dependent upon the time the trucks arrived. In certain sales there were periods of time where no cattle arrived. On 31 sales with an average of 1,127 head and 25 retags it took 8 hours, 2 minutes, 52 seconds to scan a Move In. Of the five reading scenarios utilised, the multi panel systems averaged the highest with a notional speed of commerce of 135 head per hour. The actual reading system itself is cable of reading eight tags per second, which converts to 28,800 tags per hour, which means the capacity of the equipment is much greater than the realistic Speed of Commerce in this instance.

Multi Panel/Wand Reading off Catwalk: One of the six auctions used a combination of the multi panel scanner and a wand off a raised catwalk to scan regular and calf sales. The length of time needed to scan a sale was dependent on the time the trucks arrived. On eight sales with an average of 1,195 head and 30 retags, it took 10 hours, 10 minutes, 43 seconds to scan. The notional speed of commerce at these sales was 112 head per hour. Again, the actual capacity of the equipment is far greater than its utilisation due to the speed with which stock move through the auction markets.

Wand Reading in Chute: Five of the six auctions used a wand to scan cattle in the chute for a bred sale. On 18 sales with an average of 224 head and 33 retags, it took 7 hours, 32 minutes to scan the stock as they arrived.

Pre-Sort Single Alley Reading System: One of the six auctions used the single alley system to scan in a Pre-Sort setting. Two single alleys were used to scan heifers and steers separately. Cattle were in constant motion going through the processing chute, with little to no breaks in the process. On eight sales with an average of 836 head and 15 retags, it took 6 hours, 55 minutes, 52 seconds to conduct the scanning based upon the speed at which the animals flowed through the facility. These sales had a notional speed of commerce of 111 head per hour with a maximum of 248.38 head per hour .

Bred Sales / Single Alley Reading System: One auction used the single alley scanner to scan bred sales. On two sales with an average of 405 head and 148 retags, it took 12 hours, 30 minutes to conduct Move In scanning.

In this time, staff waited for the veterinarian to pregnancy check each animal and for each lot to be moved to the chute from the pens. The limiting factor in this process was all of the other forms of intervention irrespective of the scanning process.

9.2 Peak Reading Times

During regular and calf sales there were peak times when the majority of the cattle arrived throughout the entire Move In process. This time was between 4 and 7 p.m. for the majority of the six auctions. Eight sales were selected from each of the six auctions and analysed. The software recorded the time that each EID was scanned and recorded this information within the lot. From this the peak times when the majority of the cattle arrived were found.

Peak reading time is not relevant using the single alley reading system or a wand because cattle are processed once they have all arrived for the sale. However, it is relevant for the multi panel reading system as time to scan is dependent upon the time trucks arrive. With the multi panel, an average of 450 head was scanned in the peak time of 2 hours, 27 minutes (Table 24). The averages for the multi panel and wand reading systems combined were similar at 441 head received during the peak time of 2 hours, 26 minutes (Table 24). These figures are representative of the Speed of Commerce of the facilities as opposed to the actual scanning systems as the limiting factor in the presentation of the stock to the scanner and the speed at which they safely move through the facility in line with best management practices to reduce shrink and stress.

Table 26: Average Peak Reading Time in Sale – Move In

Scanning Method	# of Head	Total Peak Time (h:mm:ss)	Head/Hr	Head/Min	Sec/Head
Multi Panel Scanner	450	2:27:57	187.48	3.12	19.20
Multi Panel /Wand Scanning off Catwalk	441	2:26:40	173.73	2.90	29.83

9.3 Time in Motion

Prior to installation of the reading systems, market management provided input on the ideal location for the multi panel RFID Readers in order to avoid impeding the speed of commerce. In some cases it was not feasible to build the reading systems in this location so a different location was chosen. As a result, cattle scanned with the multi panel reading system, or if they had to be retagged after reading, traveled outside of the area they normally traveled at the auction.

Time in Motion is defined as the time from which the animal steps foot on the auction site, through the brand inspecting and reading process, to the time they are penned.

Table 27 is based on each lot counted as a single unit moving at the same speed and at the same time from the trailer to the reading system. This movement, over the entire course of the project at all auction markets took 32.43 hours (Refer to Table 27). The distance from the multi panel reading system to the retagging chute was also taken into consideration and this movement, over the course of the entire project at all auction markets took 1.38 hours (Refer to Table 27).

Table 27: Time in Motion Summary - Total Distance (*meters*) and Time (*hour/minute*) shown per lot – Move In

Market	Scenario	Total Lots	Total Head	Meters Travelled	Seconds/Lot	Total Time in Project (<i>min</i>)	Total Time in Project (<i>hours</i>)
Scanning							
Market One	Truck to Holding Pen	643	9,851	33	8.08	86.62	1.44
Market One	Truck to Sorting Pen	1,500	22,985	119	29.15	728.63	12.14
Market Two	Truck to Feed Pen	761	23,718	15	3.67	46.60	0.78
Market Two	Truck to Sale Pen	326	10,165	57	13.96	75.85	1.26
Market Four	Truck to Holding Pen	2,050	30,410	75	18.37	627.60	10.46
Market Five	Truck to Pen	1,488	19,835	62	15.18	376.59	6.28
Market Six	Liner to Sorting Pen	311	18,664	3	0.73	3.81	0.06
Total						1945.69	32.43
Retagging							
Market One	Multi Panel to Retagging	223	3,224	12	2.94	10.92	0.18
Market Two	Multi Panel to Retagging	163	3,948	4	0.98	2.66	0.04
Market Four	Multi Panel to Retagging	285	2,991	4	0.98	4.65	0.08
Market Four	Scanning Pen to Retagging	122	1,282	55	13.47	27.39	0.46
Market Five	Multi Panel to Retagging	190	1,977	8	1.96	6.20	0.10
Market Six	Scanning Pen to Retagging	543	3,954	5	1.22	11.08	0.18
Market Six	Multi Panel to Retagging	163	9,214	30	7.35	19.96	0.33
Total						82.88	1.38

*Cattle move at 14.7km/hour (Basarab et al., 2006)¹

Multi Panel: The multi panel scanner was built outside of the normal path of travel for cattle at the majority of the auctions. This distance ranged from 1 to 119 meters to travel from the truck through the scanner and to a pen. The actual additional time taken to move the cattle this distance was a few seconds per group.

Single Alley: The single alley scanner was used for bred sales and in a pre-sort auction. This method of reading did not require cattle to travel any additional distance for the purpose of reading.

Wand: Cattle scanned with a wand reader were either in a chute or in their sale pen and could be scanned without having to travel any additional distance.

Retagging: The retag chute was built within 30 meters of the multi panel scanner at all auctions. However, when an animal was tagged, it traveled an additional distance, which varied at each site. The distance from the reading pen to the retag chute was greater, which added additional time to the process.

9.4 Time in Motion Conclusion

It was critical to implement systems with minimal impact on speed of commerce. In most cases, the distance cattle moved between unloading and penning was slightly increased, but there was little, if any, impact on wait times for cattle to be unloaded or the length of sales. There was no impact on the overall time to receive cattle nor did reading impact the speed of the sale itself.



Picture 13: Moving cattle to a retagging chute.

10 Reporting Methodology

In order to provide multiple perspectives, the reading results are presented in a variety of tables. The different types of sales (Regular, Calf, and Specialty Sales) are presented separately.

Each section begins with the most basic results. Basic Read Rates represent the percentage of which were ultimately reported to the CLTS as Moved In and Moved Out (percent Animals in Sale Read). The only exception accounted for in these tables is cattle in the sale which were not scanned. This basic information is important because it gives regulators and marketing professionals a perspective on the numbers of animals which are actually available for traceability. It also highlights the need to correct the known exceptions and points to the importance of trained personnel to operate RFID scanning systems and report animal movements.

Collecting movement information is critical, but the data must move efficiently and accurately to the CLTS. The software easily interacted with the CLTS, but errors occurred related to the data. The first section describes the common errors returned when Move In and Move Out data was uploaded to the CLTS.

In order to accurately evaluate the effectiveness of EID readers, the exceptions listed in this section must be taken into consideration. To determine the read rate percentage of functional EIDs as cattle passed the EID readers, bar code tags, non-functional (non-reading) tags, dual tags, and animals with no EID/not re-tagged were subtracted from the number of animals in a lot in most of the tables. This calculation is reflected in the % of EIDs Read column in the following tables.



Picture 14: Scanning staff collecting livestock manifest from auction staff.

10.1 CLTS Transfer Errors

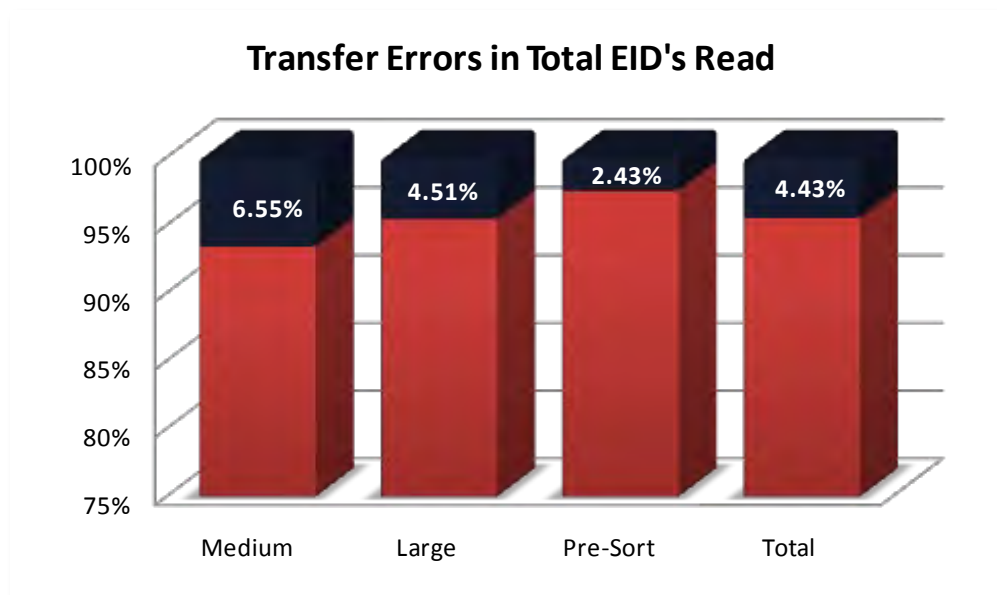
CLTS transfer errors occurred when an EID was uploaded with a movement event to the CLTS website. These errors usually resulted from unregistered tags, wrong event order, and incorrect animal tag type (i.e. dairy or bison tag in a beef animal).

An error rate of 4.3 percent in the project means that the information from 12,824 EIDs in animals read by the EID Readers were rejected by the CLTS and therefore did not enter the traceability system (Table 28). Transfer errors varied from sale to sale and market to market. There was a high percent error of 68.0 on 1667 EID's uploaded to CLTS in one sale. This high percent of errors was found only in a select number of sales and varied from 21 to 52 percent errors in individual sales. The following chart is based on Move In and Move Out EID numbers.

Table 28: Total EID Transfer Errors - Move In and Move Out

Market	Move In EID's	Move Out EID's	Total EID's	# Transfer Errors	% Errors
Medium	46,607	19,613	66,220	4,339	6.55%
Large	113,346	46,584	159,930	7,213	4.51%
Pre-Sort	67,055	9,739	76,794	1,863	2.43%
Total	227,008	75,936	302,944	13,415	4.43%

Graph 8: Transfer Errors in Total Move In and Move Out EIDs Read



10.2 Invalid Tags

Invalid tags are tags that send a corrupt number when read with a reading system. Causes of an invalid tag include a damaged transponder in the tag and extra trailer bits following the CCIA number. When these numbers are uploaded to the CLTS website they are not recognised and an invalid tag error message is returned. A total of 61 invalid tags were found in the eight months of the project (Table 61).

Although invalid tags represent a relatively small percentage of tags, there were instances of non-official EID tags in use in the market (including dairy monitoring systems and legacy non-ISO RFID) detected by the reader systems.

Table 29: Total Invalid EID Tags - Move In

Market	October	November	December	January	February	March	April	May	June	Total
Medium	1	4	1	1	1	0	1	1	0	10
Large	3	2	1	4	4	2	1	1	0	18
Pre-Sort	5	11	2	2	2	2	6	2	1	33
Total	9	17	4	7	7	4	8	4	1	61



Picture 15: Example of calf with a tag that presented an invalid tag number.

10.3 Age Verification

Table 30 shows the verification of calves across each market. In most cases markets consider calves age verified if a producer provides a birth certificate. Instances where EID numbers on the birth certificate did not match the numbers scanned were discovered as well as tags in sequential order with birth dates missing even though they were all registered with the same calving start date. In addition, animals retagged at the market prior to the sale were rarely verified post sale although other animals in the lot were age verified.

Table 30: Age Verification in Total Calf EID Tags – Move In

Market	Calf EID's	Verified	Not Verified	% of Verified Calves
Medium	26,964	21,766	5,198	80.72%
Large	75,947	64,854	11,093	85.39%
Pre-Sort	46,301	25,515	20,786	55.11%
Total	149,212	112,135	37,077	75.15%

Table 31 breaks down age verification into three sections: lots with all calves age verified; lots with some calves verified and some not; and lots with no calves age verified.

Table 31: Calf Age Verification By Lot: All Verified; Some Verified; None Verified – Move In

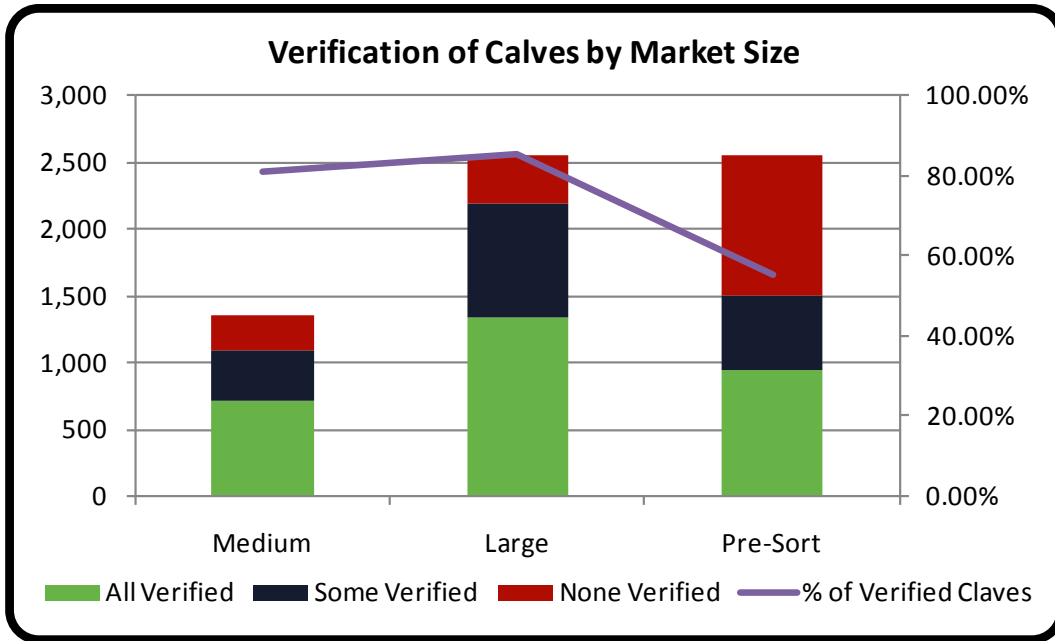
Market	# Lots	All Verified	Some Verified	None Verified	Incorrect
Medium	1,361	709	378	274	196
Large	2,552	1,337	859	356	156
Pre-Sort	2,553	938	560	1055	17
Total	6,466	2,984	1,797	1685	369

Table 32 breaks down age verification into three sections: lots with all animals age verified; lots with some animals verified and some not; and lots with no animals age verified.

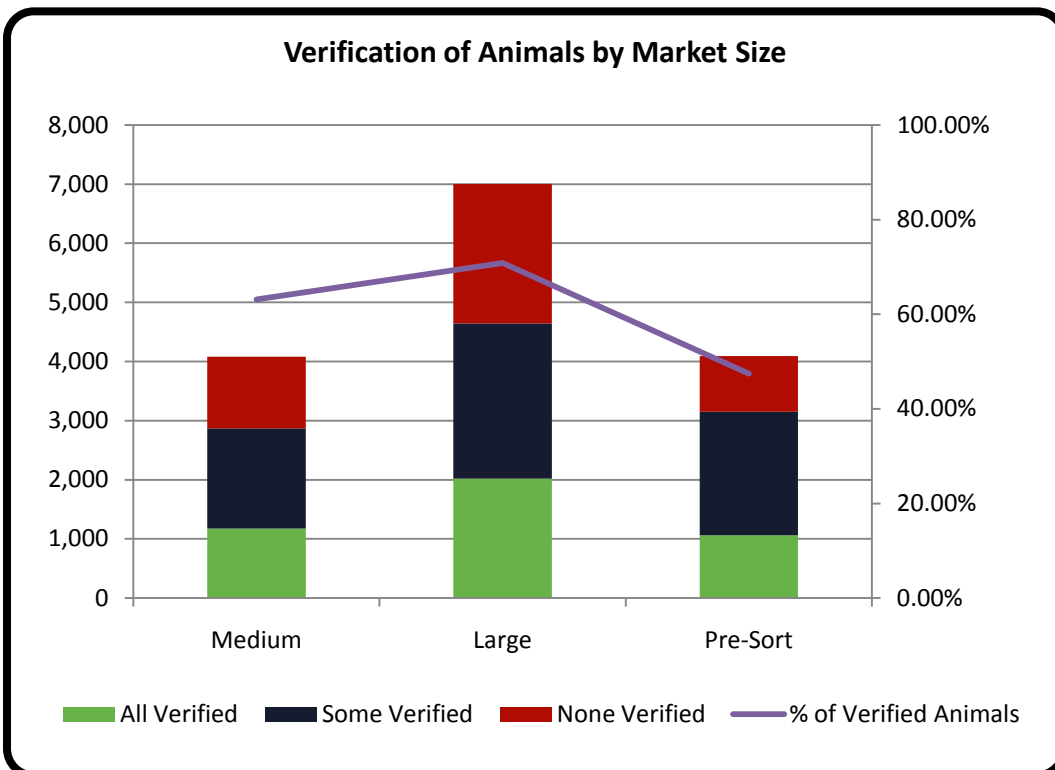
Table 32: All Animals Age Verification By Lot: All Verified; Some Verified; None Verified – Move In

Market	# Lots	All Verified	Some Verified	None Verified	Incorrect
Medium	4,080	1,174	1,693	1213	1074
Large	7,001	2,022	2,624	2355	1477
Pre-Sort	4,090	1,060	2,091	939	384
Total	15,171	4,256	6,408	4507	2935

Graph 9: Age Verification of Calves by Market Size



Graph 10: Age Verification of All Animals by Market Size



11 Reading Results Overview

11.1 All Auction Markets/All Types of Cattle

The total number of cattle scanned in the project was 328,634 (Refer to Table 33). This represents both Move In and Move Out scans.

Table 33: Basic Read Rates - Move In and Move Out

Market	# of Head in Sale	# Bypassed Scanner	EID's Presented @ Scanner	EID's Read	% EID's Read	% Exposed Animals Read	% Animals in Sale Read
Medium	94,008	1,658	89,529	87,530	97.77%	94.78%	93.11%
Large	181,099	2,347	173,448	167,511	96.58%	93.71%	92.50%
Pre-Sort	53,527	2,254	49,671	47,903	96.44%	93.43%	89.49%
Total	328,634	6,259	312,648	302,944	96.90%	93.97%	92.18%

Table 34: Move In and Move Out Summary

Market	# of Head in Sale	# Bypassed Scanner	# No Tag (not retagged)	# Bar Codes	# Non Readers	EID's Presented @ Scanner	Dual Tags	# Missed	EID's Read	% of EID's Read	% Missed
Medium	94,008	1,658	11	2,592	247	89,529	29	1,970	87,530	97.80%	2.20%
Large	181,099	2,347	354	4,210	839	173,448	99	5,838	167,511	96.63%	3.37%
Pre-Sort	53,527	2,254	1	1,300	336	49,671	35	1,733	47,903	96.51%	3.49%
Total	328,634	6,259	366	8,102	1,422	312,648	163	9,541	302,944	96.95%	3.05%

11.2 All Types of Cattle/All Auction Markets Move In

A total of 248,335 head of cattle were scanned during the move in process (Table 35). A total read rate for all cattle moved into the yards of 91.42 percent was achieved (Table 35). On a cumulative basis, 96.95 percent of the 233,827 functional EIDs presented to the RFID Readers were read and recorded (Table 36). 5,152 head bypassed the readers (representing 2 percent of the animals entering the yards) at the request of producers or market personnel or as the result of operational decisions by the project scanning staff (Table 36). Project scanning staff retagged just over 10,600 head and 366 animals known to not have tags were not retagged, which means over 4.5 percent of the cattle entering the participating markets did not have tags on arrival (Refer to Table 35 and 36). Over 7,700 head were presented with bar code ear tags and could not be scanned (Table 35). Approximately 0.60 percent of EID tags could not be read by the readers, indicating a non-functional device (Table 36). Of the 227,008 EIDs read and recorded in the software, 62.35 percent were age-verified as of 24 hours after the completion of the sale (Table 37).

Table 35: Basic Read Rates - Move In

Market	# of Head in Sale	# Bypassed Scanner	EID's Presented @ Scanner	EID's Read	% EID's Read	% Exposed Animals Read	% Animals in Sale Read
Medium	53,996	3,098	48,184	46,607	97.80%	91.57%	86.32%
Large	122,423	1,230	116,342	113,346	96.67%	93.53%	92.59%
Pre-Sort	71,916	824	69,301	67,055	96.51%	94.32%	93.24%
Total	248,335	5,152	233,827	227,008	96.95%	93.35%	91.42%

Table 36: Move In Summary

Market	# of Head in Sale	# Bypassed Scanner	# No Tag (not retagged)	# Bar Codes	# Non Readers	EID's Presented @Scanner	Dual Tags	# Missed	EID's Read	% of EID's Read	% Missed
Medium	53,996	3,098	7	2,313	439	48,184	45	1,532	46,607	97.80%	2.20%
Large	122,423	1,230	148	4,019	764	116,342	80	2,916	113,346	96.67%	3.33%
Pre-Sort	71,916	824	211	1,402	209	69,301	31	2,215	67,055	96.51%	3.49%
Total	248,335	5,152	366	7,734	1,412	233,827	156	6,663	227,008	96.95%	3.05%

11.3 All Types of Cattle/All Auction Markets Age Verification

The age verification for all sale types averaged 62.35 percent (Table 37). Age verification at some of the participating auctions was lower due to cattle being sold from Saskatchewan where age verification is currently not mandatory. Lower age verification percentages were also attributed to sales with high numbers of mature animals. Across all auctions, 2,945 incorrect birthdates were found (Table 37).

Table 37: Age Verification Summary – Move In

Market	Pre Sale Not Verified	Pre Sale Incorrect Birthdates	Additional Animals Verified	Post Sale Not Verified	Post Sale Age Verified	% TTL of Animals Verified	Total Retags	# Lots	Ave. Lot Size
Medium	23,650	1,074	6,467	17,183	29,424	63.13%	3,002	4,080	13
Large	47,612	1,477	14,564	33,048	80,298	70.84%	5,518	7,001	17
Pre-Sort	40,038	384	4,826	35,236	31,819	47.45%	2,171	4,090	18
Total	111,300	2,935	25,857	85,467	141,541	62.35%	10,691	15,171	16

11.4 All Types of Cattle/All Auction Markets Move Out

Logistics and buyer concerns limited the number of cattle recorded as they were moved out of the markets. Of all the animals entering the markets, 32.33 percent, or 80,299 head, were moved out (Table 38). A read rate of 94.57 percent was achieved for all animals moved out (Table 38). On a cumulative basis, 96.35 percent of the 78,821 EIDs presented to the RFID Readers were read at move out (Table 39).

Table 38: Basic Read Rates - Move Out

Market	# of Head	# Bypassed Scanner	EID's Presented @ Scanner	EID's Read	% EID's Read	% Exposed Animals Read	% Animals Move Out Read
Medium	20,836		20,541	19,613	95.50%	94.13%	94.13%
Large	49,484	1,107	48,302	46,584	96.45%	96.29%	94.14%
Pre-Sort	9,979		9,978	9,739	97.60%	97.59%	97.59%
Total	80,299	1,107	78,821	75,936	96.35%	95.89%	94.57%

Table 39: Move Out Summary

Market	# Lots	# Head Moved Out	# Bypassed Scanner	# Barcodes	# Non Readers	EID's presented @scanner	Dual Tags	# Missed	EID's Read	% EID's Read	% Missed
Medium	664	20,836		299		20,541	4	924	19,613	95.50%	4.50%
Large	643	49,484	1,107	69	9	48,302	3	1,715	46,584	96.45%	3.55%
Pre-Sort		9,979			1	9,978		239	9,739	97.60%	2.40%
Market Totals	1,307	80,299	1,107	368	10	78,821	7	2,878	75,936	96.35%	3.65%

11.5 Regular Sales Move In

Regular sales accounted for almost 70 percent of the cattle presented for sale at the participating markets. Regular sales include calves, yearlings and mature animals. A total of 90.54 percent of all cattle entering the markets for regular sales were read (Table 40). Overall, these sales had the second-highest read rate percentage of all the sale types, averaging 97.23 percent on EIDs presented to the scanner (Table 40). A large volume of cattle with bar code tags, 3.7 percent of the total bar codes, are found in regular sales (Table 41).

Table 40: Basic Read Rates - Regular Sales – Move In

Market	# of Head	# Bypassed Scanner	EID's Presented @ Scanner	EID's Read	% EID's Read	% Exposed Animals Read	% Animals in Sale Read
Medium	43,443	2,303	38,660	37,476	96.94%	91.09%	86.26%
Large	71,365	1,027	66,682	65,389	98.06%	92.96%	91.63%
Pre-Sort	56,125	722	53,828	51,899	96.42%	93.68%	92.47%
Total	170,933	4,052	159,170	154,764	97.23%	92.74%	90.54%

Table 41: Regular Sales Summary – Move In

Market	# Head	# Bypassed Scanner	# No Tag (not retagged)	# Bar Codes	# Non Readers	EID's Presented @Scanner	Dual Tags	# Missed	EID's Read	% EID's Read	% Missed
Medium	43,443	2,303	7	2,099	415	38,660	41	1,143	37,476	96.94%	3.06%
Large	71,365	1,027	122	2,995	601	66,682	62	1,231	65,389	98.06%	1.94%
Pre-Sort	56,125	722	209	1,198	184	53,828	16	1,913	51,899	96.42%	3.58%
Total	170,933	4,052	338	6,292	1,200	159,170	119	4,287	154,764	97.23%	2.77%

11.6 Regular Sales Age Verification/Other Information

The age verification for regular sales was the second highest for all sale types, averaging 58.08 percent (Table 42). A total of 7,089 head, or 4.1 percent, of cattle sold in Regular Sales needed to be retagged (Table 42).

Table 42: Age Verification Summary - Regular Sales – Move In

Market	Pre Sale Not Verified	Pre Sale Incorrect Birthdates	Additional Animals Verified	Post Sale Not Verified	Post Sale Age Verified	% TTL of Animals Verified	Total Retags	# Lots	Ave. Lot Size
Medium	20,438	778	4,878	15,560	21,916	58.48%	2,742	3,630	12
Large	26,492	1,106	5,574	20,918	44,471	68.01%	2,912	5,676	13
Pre-Sort	30,394	298	2,015	28,403	23,496	45.27%	1,435	3,472	16
Total	77,324	2,182	12,467	64,881	89,883	58.08%	7,089	12,778	13

11.7 Calf Sales Move In

Calf sales represented approximately 22 percent of the cattle presented for sale at the six participating markets. A read rate for all calves entering the yards of 94.61 percent was achieved (Table 43). The read rate for calves is the lowest of the three main sale types at 95.79 percent of EIDs presented to the scanner (Table 43).

Table 43: Basic Read Rates - Calf Sales – Move In

Market	# Head	# Bypassed Scanner	EID's Presented @ Scanner	EID's Read	% EID's Read	% Exposed Animals Read	% Animals in Sale Read
Medium	8,057	609	7,448	7,076	95.01%	95.01%	87.82%
Large	35,854		35,754	34,082	95.32%	95.06%	95.06%
Pre-Sort	12,894		12,900	12,583	97.54%	97.59%	97.59%
Total	56,805	609	56,102	53,741	95.79%	95.63%	94.61%

Table 44: Calf Sales Summary - Move In

Market	# Head	# Bypassed Scanner	# No Tag (not retagged)	# Bar Codes	# Non Readers	EID's Presented @Scanner	Dual Tags	# Missed	EID's Read	% EID's Read	% Missed
Medium	8,057	609		1	3	7,448	4	368	7,076	95.01%	4.99%
Large	35,854		21	8	82	35,754	11	1,661	34,082	95.32%	4.68%
Pre-Sort	12,894				9	12,900	15	302	12,583	97.54%	2.46%
Total	56,805	609	21	9	94	56,102	30	2,331	53,741	95.79%	4.21%

11.8 Calf Sales Age Verification/Other Information

At all locations the age verification rates for Calf Sales were higher than for the average of all sales, and were in the 82 percent to 96 percent range for all but one market. Less than 1 percent of calves needed to be retagged on site, which was the lowest of the three types of sales (Table 45). Neither the total number of calves presented for sale, nor average lot size, appears to have affected the read rates or the age verification percentages.

Table 45: Age Verification Summary - Calf Sales – Move In

Market	Pre Sale Not Verified	Pre Sale Incorrect Birthdates	Additional Animals Verified	Post Sale Not Verified	Post Sale Age Verified	% TTL of Animals Verified	Total Retags	# Lots	Ave. Lot Size
Medium	1,666	196	1,322	344	6,732	95.14%	27	265	30
Large	12,485	156	8,627	3,858	30,224	88.68%	222	847	42
Pre-Sort	7,691	17	2,756	4,935	7,648	60.78%	123	535	24
Total	21,842	369	12,705	9,137	44,604	83.00%	372	1,647	34

11.9 Specialty Sales “Move In”

Specialty Sales include bred cow sales, select heifer sales, purebred sales, bull sales, and pair sales. Specialty Sales represented approximately eight percent of all cattle offered for sale at the participating auction markets. A read rate of 89.83 percent was achieved for all bred cows entering the yards (Refer to Table 46). Overall, these sales have achieved a 99.72 percent read rate for EIDs presented to the scanner; they range from a read rate of 98.97 percent to 100 percent (Refer to Table 46). This higher read rate was achieved by reading most bred cow sales with wand readers at the time of pregnancy checking.

Table 46: Basic Read Rates - Specialty Sales - Move In

Market	# Head	# Bypassed Scanner	EID's Presented @ Scanner	EID's Read	% EID's Read	% Exposed Animals Read	% Animals in Sale Read
Medium	2,496	186	2,076	2,055	98.99%	88.96%	82.33%
Large	15,204	203	13,906	13,875	99.78%	92.49%	91.26%
Pre-Sort	2,897	102	2,573	2,573	100.00%	92.06%	88.82%
Total	20,597	491	18,555	18,503	99.72%	92.03%	89.83%

Table 47: Specialty Sales Summary - Move In

Market	# Head	# Bypassed Scanner	# No Tag (not retagged)	# Bar Codes	# Non Readers	EID's Presented @Scanner	Dual Tags	# Missed	EID's Read	% EID's Read	% Missed
Medium	2,496	186		213	21	2,076		21	2,055	98.99%	1.01%
Large	15,204	203	5	1,016	81	13,906	7	24	13,875	99.78%	0.22%
Pre-Sort	2,897	102	2	204	16	2,573			2,573	100.00%	
Total	20,597	491	7	1,433	118	18,555	7	45	18,503	99.72%	0.28%

11.10 Specialty Sales Age Verification/Other Information

The age verification percentages were lower for bred sales than either regular or calf sales. Just 38.12 percent of the 18,555 (see Table 47) EIDs scanned were age verified (Refer to Table 48). This can be accounted for the fact that age verification was not made mandatory until 2009. Of the 20,597 animals sold in Specialty Sales (see Table 47), 16 percent needed to be retagged (Refer to Table 48). This number is high because project scanning staff were instructed to retag a large number of cows with barcodes prior to the proposed deadline for all cattle to be tagged with EID tags, January 1, 2010.

Table 48: Age Verification Summary - Specialty Sales - Move In

Market	Pre Sale Not Verified	Pre Sale Incorrect Birthdates	Additional Animals Verified	Post Sale Not Verified	Post Sale Age Verified	% TTL of Animals Verified	Total Retags	# Lots	Ave. Lot Size
Medium	1,546	99	267	1,279	776	37.76%	233	185	13
Large	8,635	216	363	8,272	5,603	40.38%	2,384	478	32
Pre-Sort	1,953	69	55	1,898	675	26.23%	613	83	35
Total	12,134	384	685	11,449	7,054	38.12%	3,230	746	28

Conclusion

Auction markets are a critical component of the cattle marketing chain in Alberta. As Alberta moves forward with traceability, practical, economical solutions for the implementation of traceability systems at auction markets are paramount to success. This pilot project revealed the viability of the systems associated with current technology utilized in Canada and raised some additional issues that need to be addressed.

The project generated extensive data pertaining to the objectives of the project, with 248,335 cattle delivered to the markets from October to June. Systems utilized in the project exceeded the goal of reading 95 percent of the cattle coming into the market with functional EID tags with the first few sales conducted at each pilot site, including during the hectic pace of large fall cattle runs.

Weather conditions were monitored throughout the project to determine the impact of extreme conditions, especially cold temperatures, on reading systems. There was no notable reduction in read rates for the sales that occurred during subzero temperatures. Reduced battery life in wand RFID Readers was the only noteworthy result of variable weather conditions experienced throughout the project.

The unique layout of markets requires thorough evaluation of each individual market to achieve the desired results and to minimize the impact on cattle flow, cattle stress, and speed of commerce. Market management played an integral role in developing plans for the layout and positioning of reading systems in each market. In two cases, extra pens were added for staging cattle between unloading and the reading systems. Where possible, RFID Readers were located within the existing normal cattle flow. There is no standard configuration which meets each market's needs as each one of them has subtle or significant differences in layout and operations.

In comparison to how cattle moved in the markets from unloading to penning prior to the project, in four of the designated auction markets some cattle travelled extra distances in order to pass through high flow reading systems. The added distance translated into additional time in motion within the market, but did not slow the truck unloading process or any other factors relating to speed of commerce.

When possible, reading should be incorporated into existing cattle handling procedures. One of the designated auction markets conducted regular pre-sort calf sales, utilizing two single alley facilities. Bred cow sales easily lend themselves to wand reading by hand as the cows are pregnancy checked in a chute. Portable, tablet computers used in tandem with hand-held wand readers provided a practical solution for this process. Reading and data collection systems were incorporated into both of these processes with no impact on cattle flow speed.

Tagging cattle at the markets poses one of the greatest challenges to the speed of commerce and is perceived in some cases to cause additional stress and the potential for added shrink. This is impossible to quantify as the other forms of intervention imposed on the cattle at the facility such as sorting and pregnancy checking are just as likely, or unlikely, to cause issues with stress and shrink yet they are accepted as part of the everyday operational process at the markets.

During the project, 14.78 percent of the lots and 18.48 percent of the cattle were subjected to additional handling in order to identify cattle without tags and non reading tags. Animals suspected to not have tags or non reading tags were routed to a single alley reading system, an area conducive to use of a wand, or a squeeze chute for retagging. Since identifying these cattle is most difficult in high flow reading systems, staff commonly sorted out several animals in order to find one without a tag.

Sellers should be made aware that untagged cattle will be identified and tagged at the market, resulting in additional handling of their cattle and possibly other animals in a sale. Although the retagging process became more efficient as the pilot project progressed, retagging is a substantial burden in the market which can affect processes throughout the market and increases the risk for staff injuries.

There is an opportunity to develop a producer education program surrounding untagged cattle and other tag related issues identified in the pilot project. These efforts should include proper tag placement and tagging techniques relative to electronic identification tags. Proper placement enhances read rates through optimum presentation of tags to panel reading systems. Improper tagging techniques can damage tags, which usually result in non functioning tags. Slightly less than one percent of the cattle in the project had two EID tags ('dual tagged').

The importance of age verification and procedures for accurate birth date reporting should be a component of education programming as well. Perhaps more importantly, errors and exceptions related to birth date data were discovered. These included tag numbers scanned not completely matching with birth certificates presented by sellers, and incorrect birth dates. These problems can easily be addressed and corrected at the point of scanning by the staff if given the necessary permissions.

Other problems exist with data validation and accuracy which collectively contributed to only 87.91 percent of the movement events being reported into the CLTS will require continuous monitoring. Tag distribution reporting was the primary culprit in producing database errors, which resulted from movement data uploaded on tag numbers which had not been allocated to producers.

Unforeseen challenges also arose in the project. The most notable was external interference to the reading systems. In the early stages read rates fluctuated dramatically within sales at some yards. Technical support staff from Australia spent time at each yard fine-tuning the equipment and searching for, and removing, sources of interference.

While the changes to the systems made significant improvements to read rates, they didn't eliminate the interference altogether. An outside consultant who specializes in radio frequency interference was also contracted to assist in diagnosing the problem. Tests to pinpoint and eliminate the problem are ongoing.

Regardless of systems and technologies, some exceptions are unavoidable. As a result, it is imperative that trained, professional staff carry out traceability tasks at auction markets to assure accurate data collection and integration as well as for maintaining reading equipment in optimal condition. Experienced staff more easily recognizes potential problems quickly and implement the necessary changes to correct them.

This involves working with a range of people, from cattle handling staff at the markets, to CCIA staff, and various government officials. The benefit of a professional staff is exemplified by the fact that read rates increased throughout the course of the project. Efficiencies are also gained, which assures speed of commerce is unaffected.

Implementing traceability systems to record movement events to reach industry standards is achievable utilizing currently available technology. Attention to detail in each market, and processes within the market, will deliver the desirable results.

Appendix One: Reading Systems

Aleis™ Wand Reader Model 9030

03

Aleis Readers

Experience that Counts

Model 9030

Bluetooth Options Available

One piece portable wand

- Review RFID records and data on a backlit LCD screen
- Data entry keypad with large easy to use buttons
- Lightweight and ergonomically balanced
- Up to 30 hours of battery life
- Reads all ISO 11784/11785 compliant products
- Compatible with all major scales and software
- Up to 100,000 RFID storage or up to 40,000 full data records
- Up to 1,000 sessions with a maximum of up to 4,000 RFID's per session

User friendly display

Fast, Accurate and Efficient

A unique feature of the 9030 is the ability to create data templates that can be customised to your requirements. Up to 5 templates can be pre-set on the reader and using 4 x 16 character data entry fields. Scroll keys allow you to easily move through the menu to review other records and data. With exceptional accuracy the 9030 will not duplicate (unless set) an animal RFID in current session and it is easy to clear the memory from the reader when required. RFID numbers can be easily downloaded at a later time or the 9030 can be set up directly to a scale indicator, laptop or PDA. With the Aleis download software the transfer of RFID data is easy and reliable.



Reliability you can count on

Aleis have been developing and supplying livestock reading equipment for over 20 years across all sectors of the livestock industry.

Aleis equipment is responsible for reading over 60,000,000 devices annually.



The Bluetooth word mark and logos are owned by the Bluetooth SIG, Inc. and any use of such marks by Aleis is under license. Other trademarks and trade names are those of their respective owners.

- Weight: 1.8kg
- Power: Inbuilt rechargeable NiMH battery
- Data security: Non-volatile memory ensures all stored RFID's are safe even if battery goes flat
- Operating temperature: -20°C to +60°C
- Operating frequency: 134.2KHz HDX/FDX-B
- Read distance: 500mm using HDX, 400mm using FDX-B
- Data Lead: 5m reader to computer serial lead
- Data interface: Serial RS232 or optional Bluetooth wireless technology
- High speed data transfers
- Padded carry case: Part number 4092
- Aluminium heavy duty case: Part number 4085
- USB adaptor: Part number 4047
- Cigarette lighter charge lead: Part number 4048
- Bluetooth dongle for computer serial: Part number 4058C
- Variable wand lengths up to 3m
- Aleis download software
- Easy to follow user guide
- Battery charger
- 5m serial data lead
- USB serial adaptor

Aleis™ Dual Panel Reading System

-

Full Automated Panel Reader

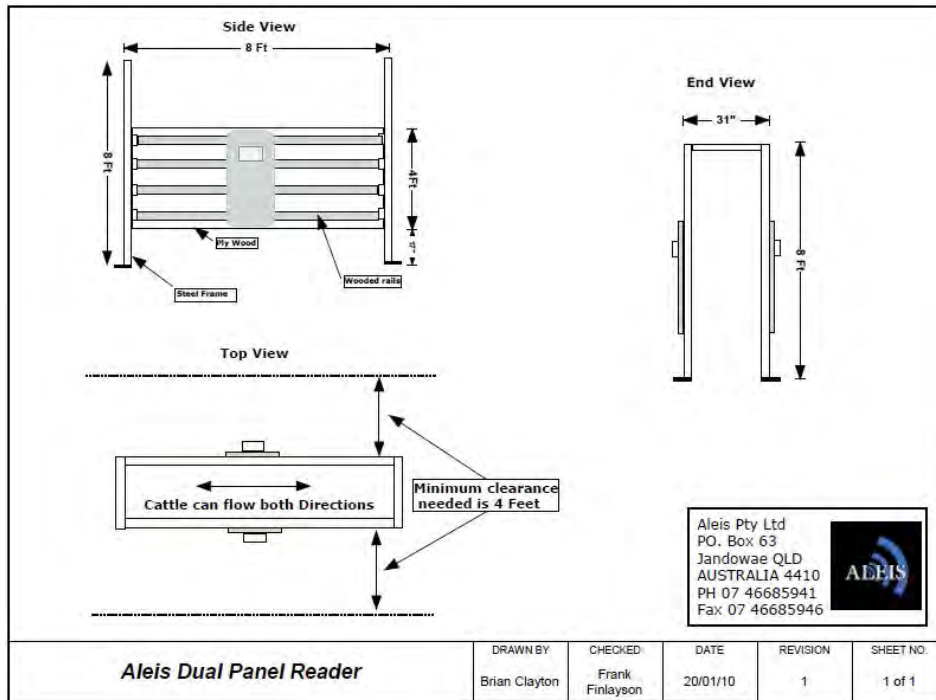
- Review RFID records and data on a backlit LCD screen
- Scroll keys to view menu and data
- Reliable and easy to use - No tuning required
- Up to 10 hours continual use from one full battery charge
- Reads all ISO 11784/11785 compliant products
- Compatible with all major scales and software
- Up to 100,000 RFID storage
- Up to 1,000 sessions with a maximum of up to 4,000 RFID's per session

Fast, Accurate and Efficient

The Aleis 8152 is a fully automated reading device specifically designed for reading rumen pellets or ear tags on animals of all sizes moving at any speed in single file. As well as a built in auto-tuner the 8152 has the ability to be manually tuned through the menu.

With exceptional accuracy the 8152 will not duplicate (unless set) an animal RFID in current session and it is easy to clear the memory from the reader when required. RFID numbers can be easily downloaded at a later time or the 8152 can be set up directly to a scale indicator, laptop or PDA. With the Aleis download software the transfer of RFID data is easy and reliable.

Diagram 1: The Single Alley Scanning System used during the project to scan Pre-Sort, Bred Cow and Bull Sales.



HIGH FLOW LANE READER



This outstanding system “successfully” reads multiples of flowing cattle with no necessity to restrict or slow them down.



The Aleis High Flow Lane Reader allows you to run cattle through in mobs rather than in single file.

The Lane Reader dimensions are:

- Length – 4050mm
- Height – 2500mm or 3200mm to allow horse and rider through
- Width – 1500mm (Lane width internal)
- Width – 2150mm (Lane width External including boxes)

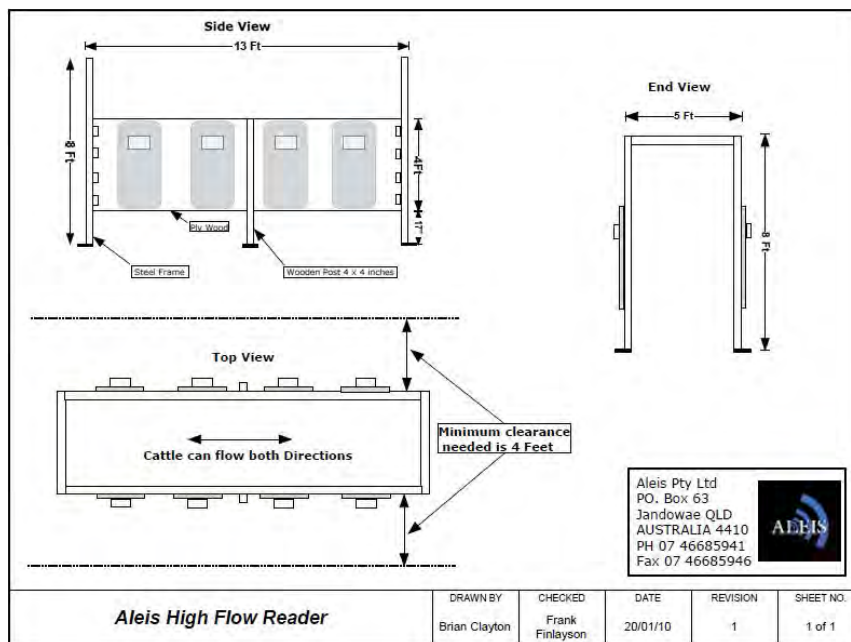
There are two models of High Flow Lane Reader

Model 6209: has data entry facilities and storage, the screen will show date, time, RFID number and session number

Model 6206: This model has no storage capacity and has to be linked direct to computer



Diagram 2: The Multi Panel Scanning System used during the project to scan Regular Sales and Calf Sales.



Appendix Two: Stockman™ Software

Stockman™ allows users to create a new file for each sale event. A file name is given to each sale which is labelled with the date it was created. User accounts are setup for uploading to the CCIA and can be chosen in the drop down menu when a new file is created.

Picture 1: File Setup in Stockman

Stockman - The Livestock Compliance Tool

Stockman

File Lots Lists CCIA Settings Reports

File Setup

File Defaults Private Auction Market

File Number: File Date: 12/02/2009

File Name: **Alberta Fat Sale**

Species: **Cattle**

User: + Add Edit

User Account: + Add Edit

User Premises: + Add Edit

Select File Events:

Age Verify Birth Date Move In

Move Out Sighted Cross Ref

Retired Imported Exported

Create File

Lots << Show Details

+ Add Edit Delete

Lot #	Lot Name	Transfer Status
-------	----------	-----------------

Total File EIDs: 0

Cancel (Esc) Save and Close (F2) Save and New (F3)

Devices CCIA

Each lot in the sale shows the;

- Lot #,
- Number of head,
- Pen number,
- age group,
- producer name, and
- manifest number.

There is a line for additional comments in the lot which is used for recording notes on the group of animals or individual animals. Users can record the number of barcodes, no tags, dual tags and non readers using the plus and minus buttons on the bottom of the lot.

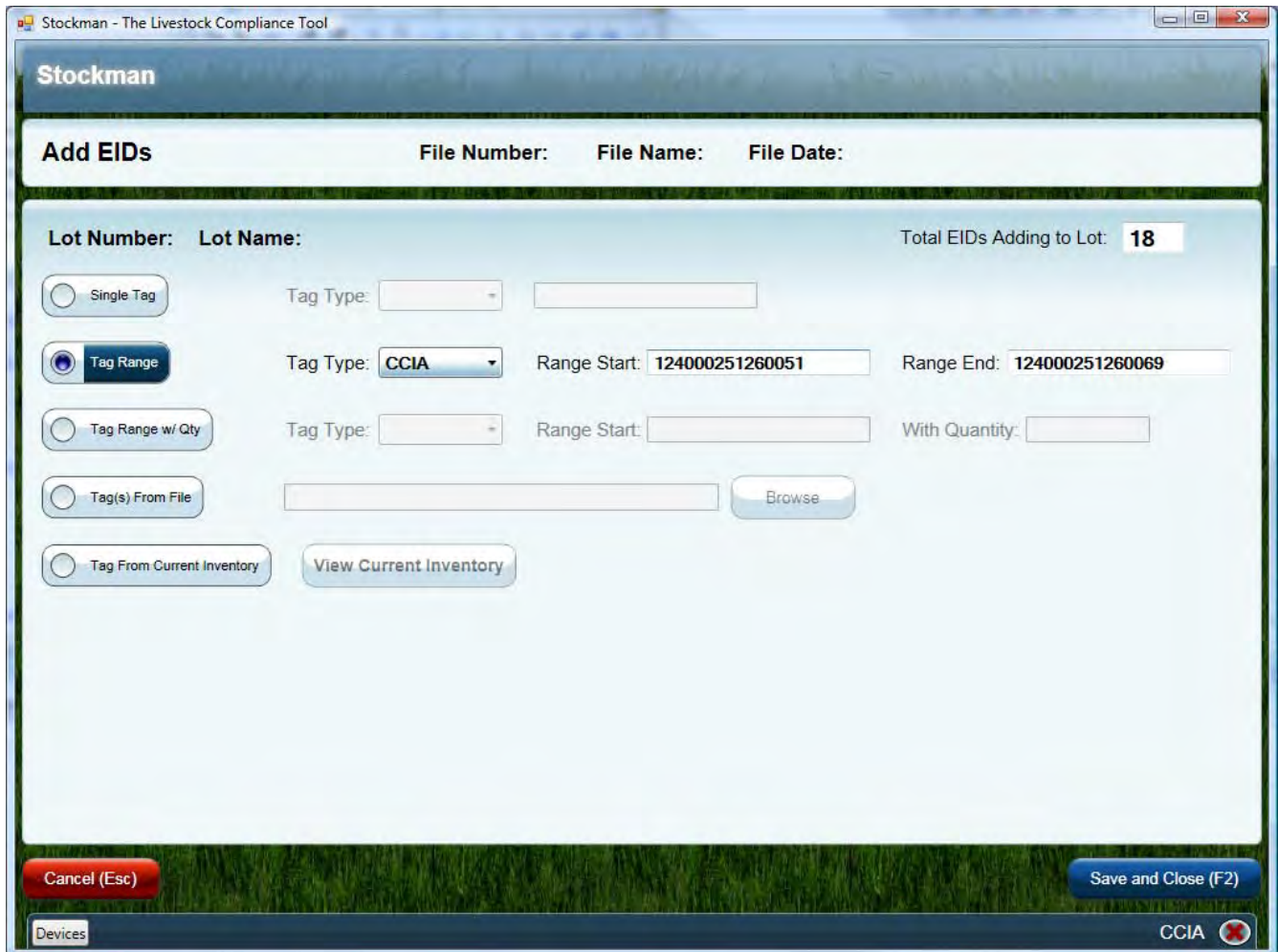
Each EID appears on the right hand side along with the time it was scanned. White EID's show that the animal is age verified correctly and red shows that the animal is not verified. EID's appearing in orange alert the user that there is an incorrect birthdate according to the age group selected

Picture 2: Stockman Software showing a lot with EID's.

■

EID's can be manually entered into the software in the Add EID's section. Tags can be entered individually or by Range Start to Range End. The can also be entered in groups by entering the first tag number in the range and then the quantity of tags being entered.

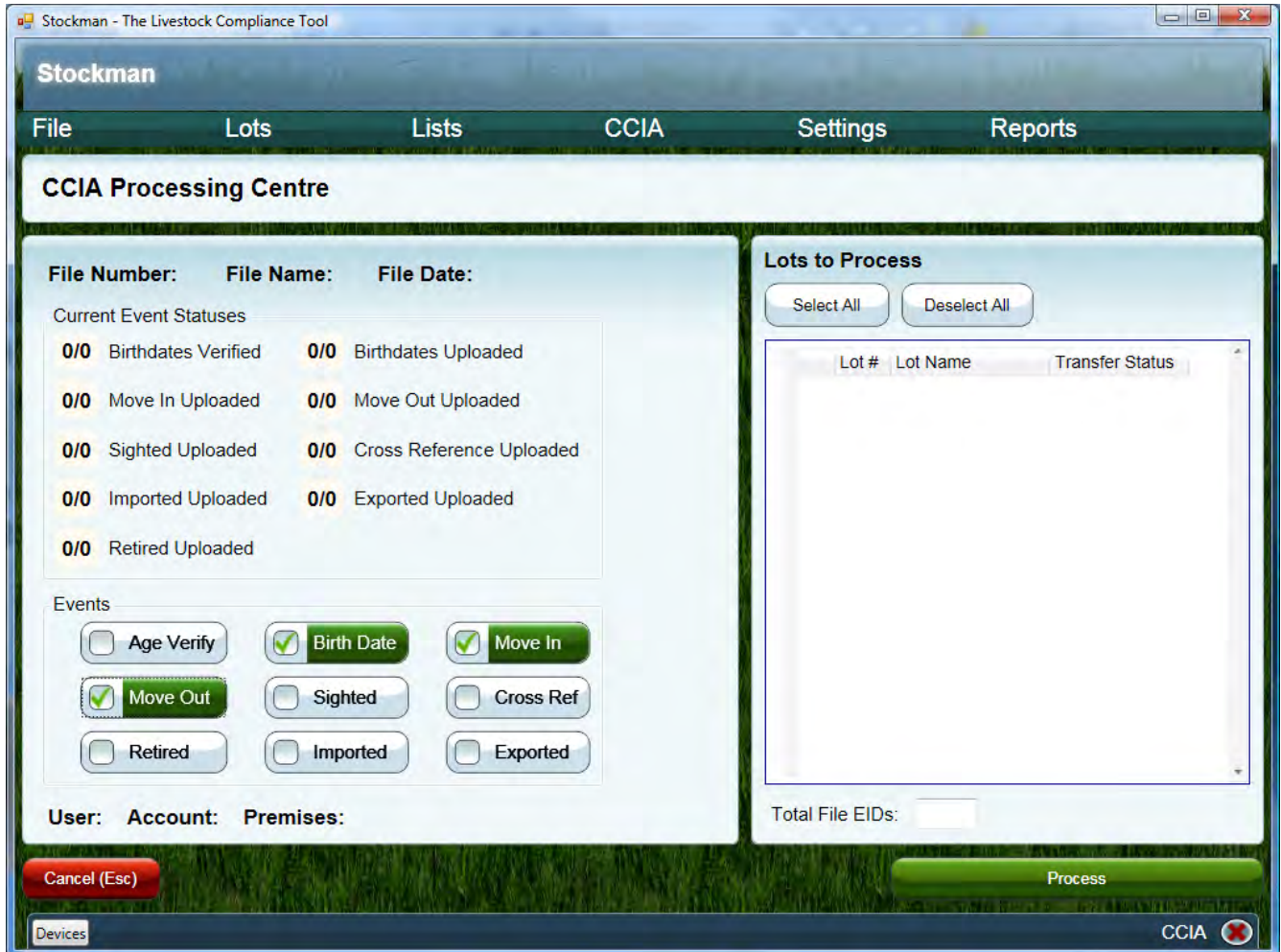
Picture 3: Entering EID's Manually



The CCIA Processing Center allows users to upload Move In and Move Out Events and Age Verification data to the CLTS database automatically with the touch of a button. Each sale is documented in the CCIA Processing center as to how many animals are Age Verified, Moved In and Moved Out.

Reading Mangers wait 24 hours after the sale and then process the age verification data to find additional animals that were verified post sale day due to the latency experienced with the existing CCIA system.

Picture 4: CCIA Processing Center



Birth certificates can be created for individual animals in the Register Birth date screen. The birth certificate is automatically generated when the user selects the Birth Certificate option and they can be printed off for producers in the scanning office immediately after their animals are processed.

Picture 5: Register Birthdates and Create Birth Certificate

The screenshot shows the 'Stockman - The Livestock Compliance Tool' application window. The main title bar reads 'Stockman'. Below the title bar, the window is divided into several sections:

- Register Birthdates**: This section contains fields for 'File Number:', 'File Name:', and 'File Date:'. Below these are fields for 'Lot', 'Lot Number:', 'Lot Name:', 'Head: + Progeny: Total:', and 'Total Lot EIDs:'. There are also dropdown menus for 'DOB Method:', 'Birthdate:' (with a calendar icon), 'Species:', 'Sex:', 'Breed:', and 'Colour:'. A text input field for 'Comment:' and an 'Apply to Selected' button are also present.
- EIDs**: This section features a toolbar with '+ Add', 'Edit', and 'Delete' buttons, along with 'Select All' and 'Deselect All' buttons. A 'Filter Options:' dropdown menu is set to 'Status Pending'.
- Table**: A table with columns: EID, Visual, Mgmt Tag, Birthdate, DOB Method, Sex, Species, Breed, Colour, Status, and Comment. The table is currently empty.
- Buttons**: At the bottom, there are buttons for 'Cancel (Esc)', 'Print Birth Certificate', 'Upload', 'Query Birthdate', and 'Save and Close (F2)'. A 'Devices' button is located in the bottom left corner, and 'CCIA' with a red 'X' icon is in the bottom right corner.

Appendix Three: Terms and Acronyms

- AARD – Alberta Agriculture & Rural Development
- CCIA– Canadian Cattle Identification Agency
- CLTS – Canadian Livestock Tracking System
- FTE – Full Time Employee
- ITS – Integrated Traceability Solutions
- LIS – Livestock Identification Services
- Manifest – is completed by the producer and is used to transport livestock in Alberta. It is used to inspect livestock at designated inspection sites (auction markets, assembly stations, inspected country sales, feedlots and abattoirs) across the province.
- MFR – Mobile Field Representative
- Permit – is issued by an inspector from LIS and is used to provide destination information from designated inspection sites (auction markets, assembly stations and abattoirs).
- RFID – Radio Frequency Identification (also generically known as EID or Electronic identification)
- RFP – Request for Proposals
- RFQ – Request for Quotes

Project Participants

Primary Manager:

Yancy Crosier

Project Manager - Integrated Traceability Solutions Ltd.

Contributors:

Garry Edwards

CEO - Integrated Traceability Solutions Ltd.

John Stevenson

General Manager - Integrated Traceability Solutions Ltd.

Ian Richardson

Business Analyst - eBiz Professionals Inc.

With Thanks to;

Scanning Managers

Bill Wilson:

Southern Alberta Livestock Exchange, High River, AB

Dave Volker:

Stettler Auction Mart, Stettler, AB

Gene Wiart:

Provost Livestock Exchange, Provost, AB

Heidi Rasmussen:

VJV Foothills Livestock Auction, Stavely, AB

Mike Rasmussen:

Perlich Bros. Auction Market Ltd., Lethbridge, AB

Rocky Rice:

Sekura Auctions Ltd., Drayton Valley, AB

Livestock Auction Markets

Bob Perlich and Ken Perlich (Steering Committee):

Perlich Bros. Auction Market Ltd.

Jerry Hewson (Steering Committee), Jack Lawes and Dean Lawes:

Provost Livestock Exchange

Greg Hayden and Jim Abel:

Stettler Auction Mart

Corey Sekura (Steering Committee):

Sekura Auctions Ltd.

Jackie Sawley:

Southern Alberta Livestock Exchange

Rob Bergevin:

VJV Foothills Livestock Auction

References

Basarab, J. A., L. Erikson, J. Kopp, J. Claypool, B. Milligan, and B. Smith. 2006. Read Rate on two multi-panel RFID reader systems for use in beef cattle. Alberta Food and Rural Development New Initiative Fund. Project No. 2005007

Bibliography

Basarab, J. A., L. Erikson, J. Kopp, J. Claypool, B. Milligan, and B. Smith. 2006. Read Rate on two multi-panel RFID reader systems for use in beef cattle. Alberta Food and Rural Development New Initiative Fund. Project No. 2005007

Canadian Cattle Identification Agency. *Trial Protocol to Test RFID Tags Version 6.0.*, 2006.

L.E. Wallace, J.A. Paterson, PAS, R. Clark, M. Harbac, and A.Kellom. Department of Animals and Range Sciences, Montana State University, Bozeman 59717



Integrated Traceability Solutions
1.877.856.1199

P 403.646.1131 F 1.866.801.1137
2010 20th Avenue Nanton, Alberta T0L 1R0